THE

ELECTRICAL REVIEW.

VOL. LXXIV. MAY 22, 1914. No. 1,904.

ELECTRICAL REVIEW.

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THE INSTITUTION AND THE ELECTRICAL INDUSTRY.

"THE Council have to report that the Industrial Committee has been dissolved." In these words we read the epitaph of a notable experiment, which unfortunately has resulted in failure. The Industrial Committee was one of the first-fruits of the Broader Policy which took its rise under the Ferranti *régime*, when the Institution shook itself together and appeared to be about to do something. It was "framed so as to secure the widest representation of the industry, and with a view to the accomplishment of effective work by utilising the organisation and influence of the Institution." Fourteen meetings were held during the 12 months of the Committee's brief existence; and then, finding that the Council was unsympathetic, the Committee declared its unanimous opinion that it was "not only desirable, but of importance to the electrical industry, that an organisation should exist which is capable of protecting and promoting the legislative and industrial interests of the industry"—what a satire on the Institution!—and that the constitution and powers of the Industrial Committee were not such as to enable it to perform useful work. The Committee desired to ascertain whether the Council would entrust it with the necessary powers and authority to do such work, or whether the Council considered that industrial questions came within the province of the Institution. And then the Council, without replying to the latter question, applied the extinguisher.

Incidentally, the Council, *apropos* of nothing in particular, took the opportunity to point out "the grave difficulties which arise if questions are dealt with which involve matters of a political character or in regard to which the interests of various sections of the membership may be in conflict," and concluded with protestations of its devotion to the interests of the industry and of its impartiality towards all sections of it.

We must confess to keen disappointment at this futile ending to the high hopes that were entertained when the Council appeared to have shaken off its lethargy. For is it not the end? Note well that the Committee was framed *to secure the widest representation of the industry*. It follows, therefore, that the industry, through its representatives, recognised and chosen as such by the Council, has found the Council unable or disinclined to act in co-operation with it; not a single item of the major propositions placed by it before the Council has received the approval of the latter.

So far as we have been able to ascertain the facts regarding the inner working of the Committee, the policy adopted by it, on the initiative of the chairman, was to attack one problem, and one only, in the first instance, and to carry that matter through to a finish before attempting any other task. The subject considered to be of the most pressing urgency, as affecting not only the parties themselves, but also the whole industry, was the long-standing dispute between the municipal supply engineers and the contractors. After many meetings with the representatives of

the bodies concerned, involving the expenditure of much time and labour, a compromise was agreed upon, and the Committee reported accordingly to the Council. The latter, however, observing that the terms of the agreement alluded to such sordid details as the payment of trade discounts, declined to associate itself with the arrangement on the ground that it was undignified to deal with money matters. The negotiations were thus abruptly ended, and a magnificent opportunity of healing an industrial dispute was sacrificed to the "dignity" of the Council.

The Committee, though rebuffed and grievously disappointed, did not lose heart, but turned its attention to the relations of the Chicago Underwriters' Testing Laboratories to our trade with Canada. (As a digression at this point, we may remark that Mr. Dana Pierce, Chief Electrical Engineer of the Chicago Laboratories, is at present in this country for the purpose of ascertaining from British manufacturers wherein they regard themselves as unfairly treated by the Code, and of discussing specific points, in the hope that by compromise the elimination of grounds for objection may be effected.) The subject was investigated, and after correspondence with British and Canadian authorities, the Committee decided that a similar testing institution was needed in this country, to deal not only with exports, but also with electrical apparatus and accessories for home use. A scheme with this end in view was formulated and submitted to the Council, but the latter regarded the proposal as having a "political" tendency, and on that ground refused to support it. The matter, therefore, was dropped, and the ultimate dissolution of the Committee became a foregone conclusion. Our sympathies are with the gentlemen who, in the hope of benefiting the industry, gave freely of their valuable time and thought, all to no purpose but to demonstrate the fact that the Council's present attitude towards "industry" differs radically from that adopted by Dr. Ferranti, who laboured to drive home the realisation that times had changed, and to galvanise the Institution of Electrical Engineers into renewed activity, so that it might take its rightful place at the head not only of the electrical engineering profession, but also of the electrical industry of this country.

The *personnel* of the Committee was published in our issue of November 22nd, 1912; it was, in fact, announced by Dr. Ferranti, the originator of the new forward policy of the Institution, as the last act of his two years' presidency. The members numbered 26, including the new president, Mr. Duddell, and the chairman, Mr. Hugo Hirst, and other well-known gentlemen, and may be classified approximately as representing the following interests:—Manufacturers, 11; public companies, 7; consulting engineers, 4; municipal undertakings, 3; contractors, 1.

A natural consequence of the appointment of the Committee was the voluntary dissolution of the "Committee for the Protection of Electrical Interests," which we recorded in our issue of January 3rd, 1913. It was expressly stated that the work of this body had been handed over to the Industrial Committee, which also undertook that of the Parliamentary Committee of the I.E.E.

Is it conceivable that a committee including such men as Duddell, Ferranti, Hirst, Siemens, Merz, Stanley—to name but a few—put forward proposals which invariably were unworthy of the attention of the Council, or hopelessly beyond the scope of its functions as representing the electrical engineering industry of this country? We should have thought that a Committee thus constituted could be counted upon to weigh well its proposals and put forward no scheme unsuitable for the consideration and support of the Council. If this be granted, why has the Council adopted this *non possumus* attitude, and how does it square its present line of inaction with the bold progressive policy to which it stood committed two years ago? Above all, if inaction is to be its future policy, how will it justify the campaign in which it was then engaged, for the purpose of increasing the membership and securing funds to carry out numerous reforms?

The tendency to form external Associations for the purpose of carrying out work that should be done by the leading body, and could be done by it with vastly greater efficiency, is still in existence; two new Associations have recently been formed to protect the interests of electrical engineers. The "Committee for the Protection of Electrical Interests" resigned in favour of the Industrial Committee, which also swallowed up the Parliamentary Committee of the I.E.E., and now is dead. Is the industry going to leave it at that? It is not likely. The Institution, after a spurt which revived the hopes of its supporters and members, appears to have exhausted its fleeting energy. There is reason to fear that the Council is drifting back into the condition of a purely academic and scientific body without an industrial backbone; a body to which the idea of trade and shopkeeping is in the last degree distasteful. We live by trade, however, and without trade we cannot even be scientific. All are agreed that industry cannot thrive without the aid of science; but it should not be forgotten that the advancement of science is equally dependent upon the prosperity of industry, and the Council will commit a very grave error if it attempts to ignore these facts for the sake of a musty tradition.

Many questions of urgency and importance in the electrical industry are pressing for solution, and new ones are continually arising; pending their settlement the development of the electrical industry in this country is retarded. Twenty or thirty years ago the electrical industry was mainly concentrated in or near London, and was controlled by a number of great engineers, who worthily occupied the presidential chair; there were no really great businesses and no very prominent commercial leaders in those days. But now, as Dr. Ferranti has pointed out, the conditions are very different; the industry has grown, and has completely changed its character, being now in the hands of business men as distinguished from the engineers, men to whom the younger generation look as the arbiters of their future. The Articles of Association were altered in 1912, *inter alia*, expressly to admit such men. The Council of the Institution, however, with the traditions of the past around it, endeavours to continue to act as though the old conditions still obtained, and appears to regard business, trade, &c., as undignified matters, unworthy of its attention *as a Council*. Ferranti, as a celebrated engineer, was able for a time to induce the Council to profess allegiance to the policy of industrial progress, but since he left the presidential chair his influence has waned, and the extinction of the Industrial Committee appears to mark the end of the "broader policy." The Industrial Committee was undoubtedly in the right when it declared that there was a need for an organisation capable of protecting and promoting the legislative and industrial interests of the industry, and if the Institution cannot, or will not, take the lead, another body will doubtless be formed to occupy that position. A somewhat similar situation arose in the United States, with the result that last year the "Society for Electrical Development" was formed, with a fund of £40,000, to educate the public in the possibilities of electrical applications, and the membership in February last was already 1,300. We have referred to its formation on several occasions, and in our issue of December 26th, 1913, we fully explained its objects and organisation. Such a society is wanted here. The centre of gravity of the electrical engineering industry has shifted from the scientific to the commercial side, and the leaders of commerce are not the men to let the matter rest where it is. The outcome will be precisely that foretold by Dr. Ferranti in 1911—namely, that if the Institution did not wake up, and look after *all* electrical interests, it would degenerate into a technical debating society.

In closing our comments, we cannot refrain from directing attention to the weakness of the penultimate paragraph of the Council's report on this subject, which we have quoted above. "Grave difficulties" arise—what are difficulties made for but to be overcome? The Council dare not even *touch* questions which some of its members regard as "political"—but cannot they distinguish between party politics (for which we share their dislike) and the "art of government" which is the true politics in which every citizen is concerned? Again, what can we say of a Council which dare not meddle with matters "in regard to which the interests of various sections of the membership may be in conflict"? Surely it is the function of the Council to reconcile those interests, not to neglect them for want of courage. The policy of *laissez-faire* commands no man's admiration.

A GERMAN ELECTRICAL AUTHORITY ON CURRENT PROBLEMS.

A certain amount of interest will probably be manifested in a report of an interview which a representative of the *Berliner Tageblatt* had at the beginning of May with Herr Emil Rathenau, who is one of the directors of the A.E.G., of Berlin, in regard to questions pending in the German electrical industry, and also in relation to that company in particular.

The first point to receive attention was that appertaining to the state of trade. On this subject the director is inclined to think that the bottom level of the general depression in Germany has now been reached, if it has not already been passed; the electrical industry has not remained untouched by the decline, but there is no perceptible retrogression in the degree of activity. This is so because instead of being hampered by the economic stagnation electrical works and improvements in industrial establishments are sometimes assisted by such conditions, as manufacturers, faced with reduced profits, endeavour to effect economies in the cost of production, which can best be done by the increased use of electricity. In addition, a large number of great industrial enterprises have been equipped with the latest technical methods in recent years, whilst the erection of large power stations has also assured the electrical industry of an abundance of work. Nevertheless, the course of business in the electrical industry has become quieter, the impetuous upward movement which existed until last year having slowed down. In the case of the A.E.G. in particular, the present activity in normal business is about the same as in the corresponding period of 1913, but a considerable increase has to be recorded if the orders are included which relate to the High-speed Railway Co. for Berlin, which has been formed by the company. The reduction in the number of workmen employed in recent months is solely due to the adoption of more modern labour-saving methods applied through specially constructed machinery. The new schemes of extension, for which sites have already been secured, have merely been postponed until better times arrive, and a certain quietness also prevails in regard to the undertaking of important technical experiments. But such pauses are by no means prejudicial to development; they are, indeed, requisite for the purpose of establishing internal order.

Herr Rathenau declared that the company had succeeded in manufacturing lamps having a consumption of half a watt per candle not only in sizes of 200 c.p., but also for small powers down to 50 c.p., and even 25 c.p., rendering their use possible for the lighting of ordinary rooms. He is doubtful whether the gas interests will be able to overtake this advance in electric lighting; in any case with the new types, the electric light will become indisputably the cheapest source of light. The consumption of energy will be reduced to such a small amount that the supply for lighting purposes will play a still smaller part in generating stations in the future, and the decrease in this department will only be equalised by the greater use of electrical energy for power purposes; the latter again will only be possible by a considerable cheapening of the charges for supply. In this connection Herr Rathenau expressed the opinion that very cheap energy for power purposes can only be produced in works of a size far in excess of the largest stations at present existing in Germany. The total consumption in Berlin now amounts to about 300,000,000 kw.-hours per annum, whereas it is probable that twice this quantity will be used by the Prussian State Railway authorities in the operation of full regular traffic on the small main-line section between Dessau and Bitterfeld. It is consequently entirely natural that the Prussian State, especially in connection with a progressive conversion of main lines, will have to erect power stations which will greatly exceed the capacity of the largest local works and overland central stations. As the cost of production progressively diminishes as the size of the plant and the output increase, and as State works are not able fully to utilise their capacity, as well as the indispensable reserve capacity at any time, it is also natural that they should proceed, as they have already done, to supply outside consumers. As a matter of fact, one State works recently submitted a tender to deliver 30,000,000 kw.-hours per annum.

If, then, it is possible for local electricity works to obtain energy cheaper from a gigantic State works than the rate at which the former can produce it on their own account, Herr Rathenau sees no reason why the supply works should be so capricious as not to avail themselves of such a supply. The works would simply purchase energy instead of coal, and utilise their own stations for the purposes of distribution. The technical possibilities of the production of electricity on the whole are almost unlimited. It would be quite possible, the director remarked, to produce the whole of the requirements of Europe in electrical energy in one place, and the long-distance transmission lines would be able to send the current all over Europe, and still further away. In practice, of course, such an extensive concentration will not take place, but it will be necessary to proceed beyond the existing system of decentralisation.

As to the question of an Imperial monopoly in the supply of electricity, it is considered that such a scheme would scarcely be practicable for Germany, now that individual States, such as Bavaria and Baden, have already regulated by separate legislation the production of energy with the aid of water power. It would, however, be conceivable that Prussia might reach a monopolistic position in the generation of electricity under State leadership or co-operation. The necessary correlative for such a grand regulation of production must of course be formed by an expropriation law for electrical works, particularly for the installation of cables through private and public property, whereas at present complicated private agreements, which are often rendered difficult through trivial motives, are essential to secure wayleaves.

Another matter covered in the course of this very interesting interview was the future position of the Diesel engine. Herr Rathenau expresses the A.E.G. conviction when he says that that company has continued to devote undiminished attention to the construction of turbines for electrical works, though he believes the Diesel engine to have a good future in such directions as locomotives, heavy motor-vehicles, auxiliary machines, ships, &c.

Rubber.

The market has had a quiet tone on the whole since last writing, and prices of fine hard Para have slipped back moderately with buyers indisposed to do much. The price of plantation sorts has also eased down, and the tone has been somewhat despondent, with heavy quantities to be negotiated at the auctions being held this week. At the early May sales about 1,150 tons were offered, and, with not much animation amongst consumers, prices fell a little, and the tone has since then been influenced by the knowledge that heavy quantities are to be handled at the auctions now proceeding. This has, indeed, proved rather a drag upon the general tendency of sentiment. The increased shipments from the Federated Malay States continue, the April total being 2,151 tons, which brings the aggregate for the four months up to 9,475 tons, compared with 7,251 tons in 1913 and 4,829 tons for 1912. As usual, the April shipments showed a reduction compared with the preceding months of the year, but there seems to be little reason to apprehend any falling off in the aggregate amounts coming forward over the 12 months. As regards the consuming trades, advices lately have been of a more cheering character, more especially in connection with the tire trade, though fair activity is noted in some other directions. As for the electrical sections, however, reports are not uniformly satisfactory, there being some falling-off of new business reported in certain quarters, which it is feared may extend.

The very unsatisfactory situation which has grown up in Brazil, as the result of the depression of the rubber trade in respect of prices, is still causing much searching of hearts for the discovery of ways and means of setting things upon a better basis. In the State of Para, for instance, a couple of co-operative societies have been formed for the protection of the rubber industry, and also of the general trade of the State, and the operation of these organisations is expected to be of material benefit. Whether they can be of any

real utility as regards the raising of prices, is, however, quite another matter, for the output of plantation rubber is steadily increasing as new trees get into the bearing stages, and is likely to increase further in the near future, though possibly not at any alarming rate. In the long run the actual cost price of collecting wild rubber must have an effect upon the selling prices of the plantation product, and there are good judges who take the view that for some years to come selling rates are not likely to fall on the average much below 2s. 6d. a lb., this being the figure generally regarded as representing the average cost of the bulk of the wild material. Certainly the cost must be somewhere about this price, and at it therefore the world's consumers should absorb all the product of the plantations until this becomes excessive. Any sustained advance upon this figure would naturally lead to an extension of efforts to put wild rubber on the market, but the outlook hardly encourages any very sanguine views of much over 2s. 6d. a lb., being the average selling price for a good while to come.

A Question of Charges.

We had almost thought that the lapse of time had softened the asperities of the old-time contest between gas and electricity, and that nowadays these two agencies for the distribution of light and power were content to exist in friendly rivalry. A recent case in the Chancery Division, however, tends to show that where electricity is supplied municipally attempts may be made to bear down the competition of the local gas company with a strong hand. Fortunately, however, for the gas company concerned, certain sections of the Electric Lighting Act of 1882 came to its assistance.

To state the facts in a few words, the defendants (the Long Eaton Urban District Council) were a local authority authorised to supply electricity by an order made under the Electric Lighting Acts, 1882 to 1888. They supplied electrical energy for the purposes of power and light. On September 25th, 1911, they issued a circular giving notice of their intention to alter their charges for electricity by increasing the charge for power to consumers who took power only, or power and partial lighting, the charge for power remaining unaltered at the lower rate for consumers who took power and all their light from them. The relators, the Long Eaton Gas Co., who were ratepayers within the district, claimed that this alteration in charges was an undue preference, and contrary to Secs. 19 and 20 of the Electric Lighting Act, 1882, and brought this action to restrain the defendants from supplying at these altered rates.

Mr. Justice Sargant held that in these circumstances there was a differentiation in contravention of Secs. 19 and 20 of the Electric Lighting Act, 1882, and that the plaintiffs were entitled to succeed. The *ratio decidendi* of this case is to be found in the following passage in the judgment:—"It would seem that A must not be charged less than B merely to overcome a greater reluctance on the part of A to become a customer, or induce A to become a customer in respect of another supply, although either of these reasons might be a good commercial reason for charging less to A were the public undertakers merely carrying on any ordinary commercial business. On the other hand, any circumstances which render it less costly, or otherwise more profitable, to supply A than B, constitute a legitimate reason for making a lower charge to A for the same supply." He went on to point out that the defendants had not satisfied him that it was cheaper or more economical for them to supply consumers who took all their supply both for power and lighting from the defendants.

Although we should naturally approve of every legitimate attempt being made to extend the sale of electricity, there is an old saying that "Fair play's a jewel." Moreover, it is to be remembered that if it is complained against a consumer that he is using gas for driving his machinery, and having recourse to the local supply of electricity merely as a standby, a remedy is now provided by the Electric Lighting Act. We should point out that the judgment of the learned Judge in this case, which we report fully elsewhere, is a most valuable exposition of the true meaning of the "undue preference" sections in the Electric Lighting Act.

A letter from Mr. Charles Carpenter, of the South Metropolitan Gas Co., which we print in our "Correspondence" columns to-day, opportunely points the moral of the Long Eaton case, and shows a friendly spirit which we welcome. The possibility that in the future the gas and electricity supply authorities will find it advantageous to join forces in amicable co-operation has on various occations been ventilated in our columns; it is a logical consequence of the enlightened views now held regarding the more economical utilisation of the riches embodied in our stores of coal. In this respect the gas manufacturers are many years ahead of the electricity works; they have eliminated waste to such a degree that the gas itself is almost a by-product in comparison with the many other valuable materials extracted from the coal. Dr. Ferranti, in his famous presidential address in 1910, urged the necessity of using coal to better advantage in the generation of electricity, and the recovery of by-products will inevitably become a feature of future electricity works practice. Our only example at present of its successful operation in a self-contained plant is that of the Accrington Corporation, but waste-heat-recovery plants are increasing in number, and it is well known that there are no insuperable difficulties in the way of progress in this direction. It may be, therefore, that at no distant date the gas engineers, experts in by-product recovery, will be working in co-operation with the electrical engineers, to the great advantage of the community.

A Means of Discovering New Diseases.

The medical fraternity must be under a debt of gratitude to the Workmen's Compensation Act, which seems to have been the means of causing a number of diseases to reveal themselves. We have recently heard of one of these "statutory complaints" being brought to light in a case at the Norwich County Court. In 1912 Judge Mulligan awarded compensation to a farm labourer named Page, who had sustained an injury owing to a piece of iron entering his thigh. In May of last year the Judge reduced the amount payable to 5s. a week, on the ground that the man could do light work. Recently, however, the employers sought to have the compensation terminated altogether, on the ground that he had not willed either to ask for or to do light work.

It was upon this application that it came to light that since the original award the man had suffered from a specific form of malady sometimes named "paralysie générale des aliénés." We presume that this is French for general paralysis of the insane. Let us see what the learned judge had to say on the connection of this disease with the failure to work. After reviewing the evidence, his Honour said he found that:—

1. A constitutional predisposition rendered Page more prone to succumb to the malady than a man of normal condition.
2. The accident preyed on his mind and set up over-excitement of the brain, which either formed part, or was an offspring, of the original injury.
3. The worry worked on the over-susceptible brain, and was the exciting cause of the malady.
4. The malady had destroyed conscious volition, and thereby incapacitated the man for work, for he was bereft of will power by the accident.
5. Had it not been for the enforced idleness consequent on the accident and for the attendant privations and worries, multiplied as they were by the unjust stoppage of all compensation in January, 1913, Page would now, in all probability, be doing his usual work.

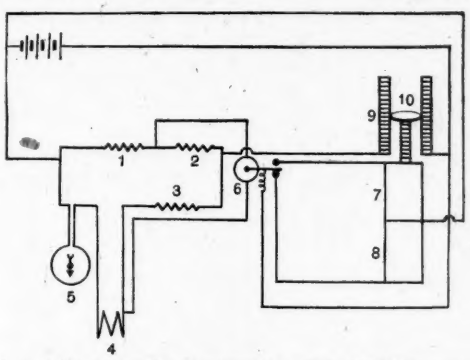
In the result, the employer had to continue the payment of compensation.

We are convinced that this case, in which, apparently, the learned judge endeavoured to assist the workman so far as he legitimately could, will do more harm than good to the working classes in the long run. It brings to light and to the knowledge of employers a fact which has heretofore been hidden in medical text-books, namely (to quote from one of them): "certain it is that, in a person predisposed to nervous weakness, an injury or shock is apt to precipitate the progressive degeneration of general paralysis, which ends fatally within a year or two." Having seen this statement, there will of necessity be a tendency on the part of employers to weed out all but the sound and strong from amongst their workers.

THE ROYAL SOCIETY SOIRÉE.

Whatever may have been the excellence of the display of scientific apparatus and discoveries at the Royal Society's conversazione last week, in other fields than those with which we are immediately concerned, it is unfortunately the fact that in the latter there were very few items of sufficient interest to place before our readers.

First on the list of these is the "Caleometer," an instrument invented and patented by Prof. Leonard Hill, F.R.S., and Mr. O. W. Griffith, B.Sc., of the London Hospital; it is designed to measure the degree of comfort in a room, or a public hall, or a factory in so far as that depends on the rate of cooling of the human body. When it is desired to measure the effect of convection and evapora-



1, 2, 3, balancing coils; 4, caleometer coil; 5, indicator; 6, relay; 7, 8, electromagnets; 9, rheostat; 10, rheostat contact arm.

Fig. 1.—The Caleometer.

tion in producing cooling, the "coil" is enclosed in a thin-walled copper case covered on the outside with an absorbent material, which is kept moist as in an ordinary wet-bulb thermometer. Usually, that is in places where the atmosphere is not abnormally dry or moist, the convective cooling of the body is so much greater than the loss of heat by evaporation, that it is sufficient to observe the changes in convection in order to ascertain and to regulate the comfortable conditions of the surrounding air. Hence the coil is ordinarily employed freely exposed to air currents. The accompanying figure illustrates the principles governing the action of the Caleometer. The "coil" 4, which is made of a wire having a temperature coefficient, forms one arm of a Wheatstone bridge, the other arms 1, 2, 3, of which are made of constantan wire. The bridge is balanced when the temperature of the coil 4 is approximately that of the human body, the heating current being supplied from accumulators or from the main supply at about 8 volts. The galvanometer 6 of the bridge forms a relay through the pointer of which a portion of the main current passes. This relay actuates one or other of the electromagnets 7, 8; when the coil tends to cool, the lower electromagnet draws down the rheostat arm 10, and so lowers the resistance in the battery circuit. An increased current then restores the coil to its equilibrium temperature. Should the coil tend to increase in temperature, the upper electromagnet is brought into action, thus increasing the resistance in the rheostat and diminishing the current.

The indicator 5 shows at any instant the number of calories per minute supplied to keep the temperature of the coil constant. It will be seen from the diagram that a compensating arrangement allows the coil to be placed at any distance from the indicating apparatus. Any number of coils distributed over a building can be switched on in succession, and so the state of the ventilation in any room can be instantly observed, or when the indicator is a self-recording one, permanently recorded. By the simple manipulation of a switch the coil will also register the temperature of the room in which it is placed. Under ordinary comfortable conditions the pointer of the indicator swings slowly about a mean value of 30 calories per minute. A low steady reading indicates monotony and oppressiveness; violent oscillations about a high mean reading indicate unpleasant draughts. At the Royal Society's soirée last week in Room 1, at 9 o'clock, with only two or three people in the room, the reading was 30 with slow oscillations. At 10 o'clock, when the room was packed full of people witnessing some gyrostatic experiments, the reading was 8, and steady. By 11 o'clock the room was empty, comfortable conditions had been restored, and the reading was again 30.

The Caleometer has been successfully used in testing the ventilation of the House of Commons.

The instrument can also be arranged so that it can automatically regulate the speed of a fan, or the current in electrical radiators, in order to produce and preserve comfortable conditions. It is manufactured by Mr. R. W. Paul, of New Southgate.

Mr. S. Cowper-Coles exhibited a collection of specimens and microphotographs of electro-deposited lead, showing the effect of varying the current density and the temperature, and of the addition of organic salts to the bath.

Mr. W. Duddell, F.R.S., showed the water model of the singing electric arc, which he used in his presidential address last year; the model has been improved, and admirably represents the phenomena of the arc. The essential feature of the device is a mushroom valve so arranged that the pressure tending to reseat it diminishes very rapidly as the valve lifts; this control is provided by a small electromagnet below the valve. Thus, when the flow of water is increased through the valve, the difference of pressure between its two sides decreases, just as the potential difference across the electric arc decreases when the current increases. When a steady flow is established, and a column of water having a definite periodic time is connected to the valve, oscillations can be set up similar to those obtained with an electric arc—the cross-sectional area of the column of water representing capacity, and the mass of the water inductance, while the tap used to control the water supply corresponds with the resistance necessary to ensure the stability of the arc. As a convenient and simple analogue of the arc, the model should prove useful in lecture demonstrations.

The Silica Syndicate, Ltd., exhibited apparatus showing various applications of the new air-tight seal between quartz glass and metal, invented by Dr. H. J. S. Sand, and described in our issue of February 27th, 1914. The difficulty of making a vacuum-tight seal for leading-in wires has hindered the development of the uses of "quartz-glass" for electrical purposes, the coefficient of expansion of quartz being extremely small. Hitherto the use of mercury to seal a mechanical joint between invar steel and quartz has been commonly adopted, but this is open to many objections. The Silica Syndicate, Ltd., in 1911 patented a method of sealing-in molybdenum wire, which constituted a decided improvement, but the invention of a lead seal, for which the patents have been acquired by the Syndicate, has made

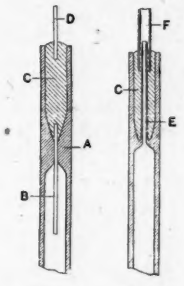


Fig. 2.

Fig. 3.

Sections of Joints Between Wire and Metal Tube, and Quartz Tube.

it possible to effect a true seal by simple means. An ordinary seal is shown in section in fig. 2, where A is a quartz-glass tube constricted to hold wire B, C is the lead, and D is the external conductor. The diameter of the lead plug is about 2·5 mm. The seal made in this way has been applied with success to vacuum tubes, X-ray bulbs, mercury vapour lamps, &c. By similar means it is possible to join metal tubes to quartz-glass tubes, as shown in fig. 3, where E is a narrow quartz-glass tube, and F is a tinned-copper tube which is slipped over the inner tube while the lead is still molten, making a vacuum-tight joint. These devices enable the use of quartz-glass to be greatly extended.

Messrs. Chance Bros. & Co., Ltd., showed a series of glasses for spectacles, intended to absorb ultra-violet and infra-red rays and for the reduction of glare, the outcome of the work of Sir William Crookes, P.R.S.

The electrification produced by raising a cloud of dust was demonstrated by Mr. W. A. Douglas Rudge, and Mr. C. J. Woodward showed a lecture apparatus illustrating the formation of a complex wave by a combination of two or more simple harmonic waves. Mr. F. E. Smith, of the National Physical Laboratory, exhibited a remarkable photographic record of the variations in the horizontal intensity of the earth's magnetic field at the Laboratory, showing the variations due to the earth currents straying from the London United Electric Tramways. Dr. J. A. Fleming, F.R.S., showed his apparatus for the production of stationary vibrations on strings, to illustrate the laws of wave motion, and Mr. Rollo Appleyard, M.Inst.C.E., exhibited a simple apparatus intended to facilitate the teaching of mathematics relating to logarithms and to the important group of mathematical quantities known as "hyperbolic functions," which enter into a number of engineering, physical, and chemical problems, by presenting examples of those quantities in a tangible and connected form. The apparatus consists of a chain suspended so as to form one-half of a true catenary, and it is shown that by suitably proportioning the scale of measurement to the tensions of the chain, the various quantities required can be obtained, to a first degree of approximation, by direct measurement from the suspended chain. These quantities include the base of the Napierian logarithms; the anti-logarithms of numbers to the Napierian base; and the hyperbolic functions, sinh x, cosh x, tanh x, and sech x. Special interest attaches to the apparatus, as it is just 300 years since the invention of logarithms by Baron John Napier, of Merchiston. It is also noteworthy that during the last few years hyperbolic functions have entered extensively into the practical work of telephony, and it is by their application that the increased distance through which speech can now be transmitted has been secured. It has, however, been difficult for students to obtain an understanding grasp of the nature of hyperbolic functions, and Mr. Appleyard's extremely ingenious device should be found of great assistance in this respect.

THE "FLYING TRAIN."

The exigencies of time and space last week compelled us to restrict our references to the Bachelet "levitated train" to the most prominent objections to its practical utility, namely, the enormous cost of such a system, and the enormous power that would be required to support and propel the cars. But sufficient was said, we believe, to demonstrate the commercial impossibility of transportation by this system, and as the whole of the technical Press of necessity expressed the same opinion (except the *Engineer*, which did not even think the matter worth mentioning), we trust that the mischievous effects of the misleading statements of some of the daily papers will be mitigated, though they cannot be wholly obviated.

It is difficult enough to obtain capital for a sound and salutary engineering undertaking nowadays, without the additional reluctance that would be engendered by the failure of unsound schemes—for which, strange to say, there is always plenty of money available. Truly, Carlyle—but why blame the innocent sufferers who are induced to part with their savings by the irresponsible and uninformed declamations of Cabinet Ministers, military and naval officers, Lords, novelists and—we grieve to say it—editors of the non-technical Press? We hasten to except the *Times*, which dealt with the matter in a sober and rational way, and the *Telegraph* and *Morning Post*, which apparently declined to touch it.

As for the supporters of Mr. Bachelet, who discreetly keep in the background and concentrate the interest on the inventor, we know nothing of them, but we know that the apparatus was exhibited in the United States in 1912; it would be interesting to know why it left New York. Moreover, we should be glad to know why the first public demonstrations in London were given at a time when the technical Press was out of the way for a week. It may have been a fortuitous occurrence—but it is very certain that if the technical Press had been invited to the first demonstration, as is customary in the case of new engineering developments, the furore in the lay Press and in the public mind

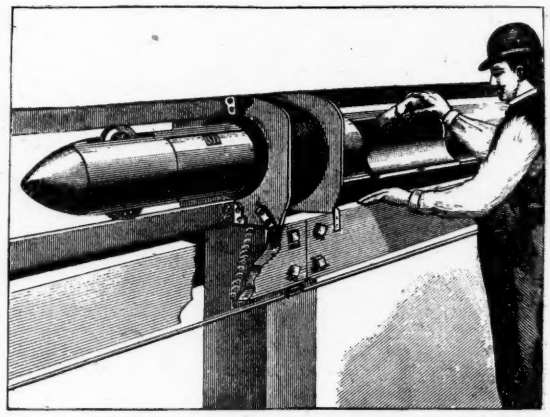


Fig. 1.—The "Portelectric" System of 1890.

could never have taken place. Did Mr. Bachelet's friends know this—from previous experience? and was the date an accidental choice?

Fortunately, the *Daily Express*, which with the *Standard* worked the sensation for all it was worth, and, leading the blind, has done its best to fall with them into the ditch, did us the honour to quote our statements that the invention was a "scientific toy" (the same expression that our contemporary, *Engineering*, used on the same day), and that no sane man would risk a farthing on such a scheme. These were the facts that we wished to have placed before the general public, and we are sincerely grateful to the *Express* for affording them publicity in quarters that we cannot reach directly. True, our contemporary goes on to say that "the effect of such 'criticism' as this is rather spoilt when one reads the names of the many eminent public men and engineers who have seen the invention and pronounced the verdict 'wonderful,'" and in the next line states that "A special article by Mr. H. de Vere Stacpoole, the famous novelist, on the flying train appears on page 4." Suffice it to say that Mr. Stacpoole concentrates on the repulsion experiment as something that has never been done by any man before, whereas Mr. Bachelet himself disclaimed the discovery of electromagnetic repulsion.

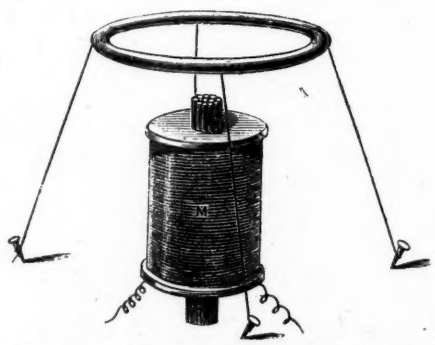


Fig. 2.—Copper Ring supported by Electromagnetic Repulsion in 1890.

In our issue of October 31st, 1890, p. 522, we published the illustration which is reproduced above, showing the "Portelectric" system as exhibited in Boston, U.S.A. A track 3,000 ft. in length was constructed, on which the carrier ran at 30 miles an hour. The car was an iron cylinder 10 in. in diameter, and 12 ft. long, weighing 350 lb., and it was intended to run at 120 miles an hour under the attraction of fixed solenoids, of which one is shown in the figure. Great hopes were entertained of the commercial future of the system, but the difficulties were

too great, the mode of propulsion proposed being as hopelessly inefficient then as it is now.

Earlier in the same year, in our issue of April 25th, p. 471, we printed an abstract of a lecture by Prof. Elihu Thomson before the American Institute of Electrical Engineers, in which the author described a variety of experiments on the repulsive action of alternating-current electromagnets, some of which he had devised five years previously.

But earlier still, in our issue of June 10th, 1887, page 544, we reproduced a paper by Prof. Thomson, also read before the American Institute, in which he for the first time propounded the laws of electromagnetic repulsion. Fig. 2, taken from our issue of May 23rd, 1890, page 580, shows a copper ring supported in air by this means, the strings being used simply to keep the ring from jumping off the magnet altogether; this was shown by Dr. Fleming before the Society of Arts in London, when he reproduced Prof. Thomson's experiments. Thus the materials for the Bachelet railway were familiar to electrical men in this country in 1890.

Now let us consider the present proposition from a practical point of view. The following considerations are obvious to an electrical engineer:—The method of support is electrically so inefficient that the expenditure of power necessary is out of all proportion to the result obtained—at least 100 times the power required to overcome wheel friction.

The eddy currents upon which the effect depends necessarily heat the aluminium plate in which they circulate, so that the plate would become red-hot if the action were maintained for long (probably the chimes and other toys exhibited fulfil the useful purpose of giving time for the plate to cool between demonstrations); the cooling action of the air at high speeds would partly counteract the heating, but this does not exist when the car is at a standstill.

The magnets with which the track is continuously paved would have to be protected from the weather; no metal casing could be used for this purpose, and therefore the track must be provided with a continuous roof. The amount of copper required for the magnets of even a light parcel railway, at £80 a ton, alone would cost something like £8,000 a mile; for a full-size coach carrying passengers from London to Manchester the whole of the world's production of copper for three months would not suffice, to say nothing of the other materials or the labour of construction. The inventor himself has discarded solenoid propulsion for passenger cars, and talks of air propellers, which means that he must carry motors on the cars to drive them; if the power for these were supplied electrically, it would tax the utmost resources of the engineers to maintain contact with the line conductor at 300 M.P.H. And what would be the power required? Mr. Bachelet, we believe, says it requires 1 KW. to sustain 10 to 15 lb.; a car to carry 20 people at high speed would weigh at least 9 tons loaded, which would require, on Mr. Bachelet's own best figures, at least 1,350 KW., merely to support it. The motor to drive the air propeller has not been included in the weight; a traction motor of 250 H.P. weighs about 2½ tons, but to propel a car of this size at 300 miles an hour would require at least 2,500 H.P. Need we go further? Surely it will be obvious that the idea is a monstrosity.

But we have not referred to the track construction, apart from the magnets. Provision must be made for supporting the car in the event of failure of the levitating power, and at any speed; therefore, the track rails must be as substantial as if no levitation were employed, throughout the length of the line. Moreover, they must be so arranged as to maintain the car safely in the proper direction of motion—the provision of repelling magnets at the sides to serve this purpose would be too awful to contemplate—whether the car was floating or rolling; and, lastly, as the vertical position of the car is indefinite, there must be guard rails at the top. Thus the cost of the structure would easily amount to three or four times that of a railway of the ordinary type, even without allowing for the extra cost to cope with the forces resulting from the high speed. The construction at curves would be so costly and difficult that curves would not be permissible at all.

Returning to the electromagnets in the track, these would necessarily be of the open magnetic circuit type, and would have a power factor in the neighbourhood of 0·1; the generators supplying the track magnets therefore would have to be of enormous size compared with their effective output. It will be seen that wherever we touch the scheme, it is from an engineer's point of view fundamentally impracticable; it is no less so in the eyes of a railway traffic manager, for the amount of traffic, whether parcels or passengers, that could be carried on such a system would be ridiculously inadequate to the expenditure.

According to our contemporary, the *Engineer*, of October 18th, 1912, Mr. Bachelet himself, when the system was exhibited in New York two years ago, did not even remotely contemplate its application to passenger traffic; such a suggestion to him smacked of the ridiculous. How is it, then, that he has permitted the London Press day after day to foreshadow the carriage of passengers at high speeds? Even for parcels it is a fantastic idea, doomed to a speedy end.

POWERFUL ELECTROMAGNETS FOR LABORATORY USE.

[BY OUR BERLIN CORRESPONDENT.]

PROF. PIERRE WEISS, of the Federal Polytechnic High School, Zurich, has, during the last few years, given much attention to the problem of designing electromagnets capable of generating exceptionally strong magnetic fields for laboratory use.

In the case of the first magnets constructed according to the principles developed in this connection, the windings of

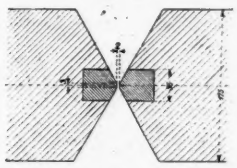


FIG. 1.—SECTION OF POLE-TIPS.

the two magnet coils were arranged in a brass or bronze oil tank, the heat generated in the coils being carried away by copper cooling pipes. Since, however, the space available for the coils and pipe was necessarily limited, the cooling thus obtained was rather inadequate, and this, in some cases, resulted in serious trouble.

This induced Prof. Weiss to improve his system by using as conductors for his magnet coils, copper tubes traversed by cooling water, and thus carrying away immediately any heat evolved. In view of the considerable hydraulic pressure required in the case of a great number of windings arranged in series, the coils were wound in several sections, arranged electrically in series and hydraulically in parallel. The hydraulic resistance could thus be adapted to the available water head, the magnet being connected up direct to the water mains.

In each coil section the cold water, as it enters, is led direct into the interior of the coil and made to flow through all the windings of the section, thus ensuring most efficient cooling of the interior of the coil as well as the magnet core, and keeping their temperature practically constant. The temperature rise of the magnet coils in no case exceeds 50° C., and by a proper regulation of the water flow can be kept within any limits desired.

Another important fact brought out by Prof. Weiss's work is that an alloy of iron and cobalt will show a magnetic saturation 10 per cent. higher than ordinary iron. This fact is utilised by making the magnet pole-tips of this alloy.

While it has been so far impossible to obtain the alloy in sufficient quantities to allow the whole of the magnet poles to be made of this material, a distinct improvement has been realised by using cobalt-iron in manufacturing their extreme tips. Some very striking comparative tests made by Prof.

Weiss on an electromagnet designed for the laboratory of Prof. J. Becquerel, of Paris, are recorded in the following table :—

Diameter of head surfaces.	Air-gap.	Ampere turns.	Field intensity.		Power absorbed.
			Iron.	Iron-cobalt alloy.	
			Gauss.		
mm.	mm.				kw.
3·00	2·00	25,000	39,800	41,840	·34
3·00	2·00	50,000	43,540	45,790	1·37
3·00	2·00	100,000	45,780	48,020	5·5
3·00	2·00	200,000	47,570	49,990	22
3·00	1·00	200,000	52,580	55,170	22

While the extreme pole tips, made of iron-cobalt, only allowed a field intensity 5 per cent. higher to be generated, the power absorbed with a given field intensity, in the case of iron and iron-cobalt tips respectively, bears a ratio of 4 : 1.

The electromagnet of Prof. Becquerel's laboratory has

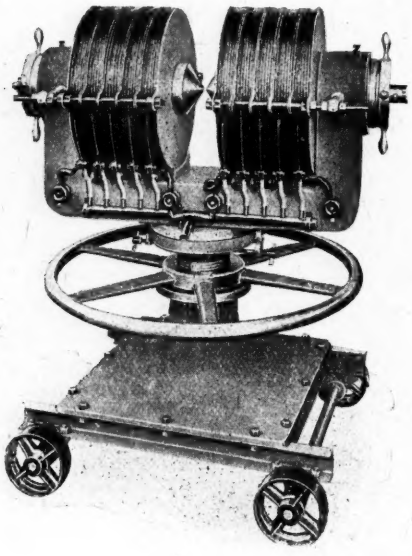


Fig. 2.—Weiss Electromagnet.

been constructed by Messrs. Maschinenfabrik Oerlikon, and is represented in fig. 2. The magnet frame proper rests in a ball bearing on a threaded pillar, allowing the magnet to be adjusted at will in a vertical direction.

The magnet is carried on a light truck, and is readily used at any place in the laboratory. The above improvements in the design of electromagnets are patented by Messrs. Maschinenfabrik Oerlikon.

SOME POINTS IN THE EDUCATION OF THE YOUNG ENGINEER.

By W. J. CRAWFORD, D.Sc.

There are several ways in which a youth may prepare himself for the trade or profession of engineering, and I propose to say a few words about them. I do so because I am continually asked questions by young men anxious to wield the hammer and chisel, and because I find that in spite of all that has been written on the subject, parents and guardians have very little real idea as to how to start their sons upon the right road.

There can be little question that the reign of the rule-of-thumb and unscientific engineer is over. I do not mean to say that very good work was not done by this class in the past. As a matter of fact, much excellent work was done, but it was in the days when things were taken more leisurely than now, and at a time when there was not so much competition. So I think few will be found to differ when I say that the embryo engineer must consider the scientific side of things as well as the question of his actual workshop apprenticeship—a combination of the two is what is desired and required—and I think I can do no better than indicate as shortly as possible how this combination may be obtained.

A good elementary education is absolutely essential. The lad should remain at an ordinary elementary school until he has passed the seventh standard—or the sixth at least. By that time he will be about 13 years of age. The real difficulty then presents itself, What is he to do now? How is he to proceed so that in future years he may find himself in the forefront of the fight and not lingering haltingly in the rear? The answer depends largely upon his position in life, or at any rate the position of his father or friends. If he is well off, he will have a university course in mind; if he is not too well off he will be unable to afford the money and time required for such a course. In the great majority of cases he is not very well off. The father cannot see his way to send his son to the university, but he is very desirous of giving him a sound and advantageous training. What, then, is to be done? Well, briefly speaking, after the elementary school is finished with, there are three courses open. The lad may attend :—

1. An ordinary secondary school.
2. A trade preparatory school.
3. An engineering shop to serve his apprenticeship.

Let us consider these separately.

1. The secondary school gives a boy a good secondary education, including something of Latin, French, mathematics and so on. This is very good training if the boy is going to the university afterwards, but not the best if the reverse is the case. It is unwise to specialise too early, but at the same time, if the university is not the objective, the tendency in the couple of years after leaving the elementary school should be on the scientific and practical side. This is seldom the case at the ordinary secondary school, although to be sure I have heard weird tales of some of them having an "engineering" side.

2. The trade preparatory school is a comparatively recent branch of the teaching art. I consider it much the best school for our lad to enter. The teaching is strongly scientific and practical, although a good English education is given. French, German, history, &c., are also taught. The course usually lasts for three years, but I think two years will be found most suitable in the majority of cases. It is astonishing what an amount of good, solid useful information can be assimilated by a boy in the two years—knowledge which enables him not only to speak the King's English, but at the same time prepares the way for an understanding of his workshop duties. And how wonderfully cheap these trade preparatory schools are! Sixpence to a shilling per week in the majority of cases, and dozens of scholarships usually thrown in for competition amongst the most industrious.

3. The boy may enter the workshop immediately on leaving the elementary school and attend technical classes two nights a week during the winter. But this is a bad course to pursue. He will soon find himself at a disadvantage as compared with his more fortunate companions.

I strongly advise attendance at a trade preparatory school. When the lad has finished with it, he will be 15 or 16 years of age, and ready to serve his apprenticeship. He should accordingly be apprenticed at once. During the winter he should attend a technical school, where, by reason of his previous training, he will be able to take the higher classes. At the end of his apprenticeship he will find himself, if during all this time he attends regularly the technical classes, possessing a very substantial foundation for his future career as an engineer. He will have a training in the scientific side of engineering little, if any, inferior to the man who has undergone the orthodox curriculum of a university—and at a tithe of the cost.

CORRESPONDENCE.

Letters received by us after 5 P.M. ON TUESDAY cannot appear until the following week. Correspondents should forward their communications at the earliest possible moment. No letter can be published unless we have the writer's name and address in our possession.

The Meetings of the I.E.E.

Letters of protest such as Mr. Farrer's in your current issue are evidence of life, and if such energy is properly directed should benefit the Institution, although many will consider that the public Press is not the place for ventilating complaints.

My habit is to consult the ELECTRICAL REVIEW'S list of "Forthcoming Events," and I do not find the absence of the postcards announcing meetings a serious matter. Mr. Farrer's ½d. has to be multiplied by 7,000 to get an estimate of the importance of the economy in stamps.

An alteration that has affected me is the withdrawal of the supply of advance copies of papers on selected subjects of interest to each member, which was based on a single request at the beginning of a session itemising the subjects one is particularly interested in.

Another room for improvement is in the organisation of the discussions on papers, and this is not limited to the I.E.E. only. It should be of sufficient importance for Members of Council who are specialists in different branches to take a personal interest in organising discussions on papers which come forward on subjects in which each is expert. They would know who are capable critics, and who are in a position to give valuable material in discussions; and, while it is not my desire to take away the opportunity for practice from inexperienced speakers, it is due to any member who prepares a paper to the satisfaction of the Examining Committee to have that paper discussed intelligently and efficiently. It ought not to be possible for a discussion to be cut short "for want of time."

Theodore Stevens.

London, E.C., *May 13th*, 1914.

Electricity and Gas Supply.

It has been suggested upon more than one occasion in the electrical Press that gas undertakings and suppliers of electrical energy should work in greater harmony than is customary at present. This must be my excuse for troubling you with this letter, in which I desire to point out that the decision given yesterday by Mr. Justice Sargant in the Court of Chancery upon the Long Eaton case is not likely to hinder such a consummation. However desirable it may have appeared to some suppliers of electrical energy that gas undertakings should be wiped out of existence, they were never given their statutory powers for such an object. In this fundamental respect they differ from an ordinary trader, who is free to sell his goods to any customer he chooses, and at whatever price he chooses, and to go any length in this direction, even if his avowed object be to smash up the opposition shop in the same street. If energy suppliers will but take to heart the difference between fair and unfair trading (or preference), they will get their share of the supply of light, heat and power in response to the demand the public makes for it, which was the privilege Parliament meant to bestow when it gave them their statutory powers.

Charles Carpenter.

London, S.E., *May 13th*, 1914.

[We refer to this letter in our leading columns.—EDS. ELEC. REV.]

Deterioration of Red Cable.

I enclose herewith two samples of 3/22 V.I.R. cable, regarding which I should appreciate your comments.

The cable was manufactured some four or five years ago by one of the leading firms in the C.M.A., and was erected in Simplex tubing in a dry but fairly warm atmosphere. The black cable appears quite sound, but the rubber on the red cable is cracked about every half-inch or so, and its insulating properties are quite negligible.

The point is that from time to time I have heard that the ordinary red cable—which is generally used as the switch wire on lighting installations—is much inferior to the black cable, owing presumably to the ill-effect of the red colouring matter; and I know one or two engineers who, for this reason, will not use red cable at all.

Personally, this is the first time I have ever met a case which appears to support the above argument, and I should like to know whether any of your readers can instance similar cases of failure.

H. B.

"Schoeller" Miners' Lamp Gas Detector.

Mr. Fred. J. Turquand's letter, which appears in your last issue, only proves that Schoeller has been successful, where Mr. Turquand has failed.

I do not propose to enter into a discussion at the moment. The lamp can be left to speak for itself when the time comes.

W. Schmahl.

London, E.C., *May 16th*, 1914.

The Problem of the Small Consumer—1908-1914.

On opening the current week's issue, I was forcibly struck by the phrase heading this letter. It brought to my mind the sub-title of an article passing through several issues of the REVIEW in June and July, 1908, in which I dealt very fully with "the problem of the small consumer." In that article, if I remember correctly, the majority of the principles on which "the Fixed Price Light Co." have built their scheme were enunciated. The one supply company's branch feeding by means of overhead or exposed mains a series of small consumers was one of the points which I then indicated. The provision of a transformer system was another. In the particular article referred to I suggested an auto-transformer, but with the proviso that this might not be passed by all supply authorities, and that a double-wound transformer might be necessary.

I am pleased also to notice that the diversity factor of this class of business is just what I anticipated it would be, and it certainly gives me pleasure to notice that the company are making a success of the demand from the small consumer. It does not surprise me at all that the revenue which they are obtaining "considerably exceeds the average revenue per lamp obtained from the Corporation supply as a whole." This was proved in this neighbourhood by the Clyde Valley Co. about five years ago, when they supplied a number of tenement houses somewhat on the lines of my scheme, and charged a fixed price per lamp. I trust that the company will extend their operations to other districts than Wimbledon, and I feel sure that there is a big revenue waiting for the Supply Co. which tackles the small consumer in a systematic and proper fashion.

Great credit is due to Messrs. Handcock & Dykes, the consulting engineers of the company, and to Mr. Lee of the Wimbledon Corporation, for having so fully developed the source of revenue which was all the time lying to their hand.

In view of the fact that I was one of the earliest to draw attention to this untapped source of revenue, it affords me personally a good deal of satisfaction to see that my forecasts have been so fully realised. It was certainly not "unexpected" by me.

John D. Mackenzie.

Glasgow, *May 18th*, 1914.

Frequency Changer.

If a direct current of suitable voltage be connected in series with an alternating current so that during half of one cycle its voltage will be added to that of the A.C. voltage and during the other half of the same cycle its voltage will be in opposition to that of the A.C. voltage, a pulsating current will be obtained at one half of the frequency.

Would some of your readers be kind enough to inform me whether this arrangement could be used for any practical purpose?

F. W. T.

[The superposition of D.C. on A.C. attracted much attention some years ago (see ELEC. REV., July 6th, 1900). We pointed out at the time that the gain in efficiency claimed for it was groundless. It may, however, be of use in some special applications.—EDS. ELEC. REV.]

Charging a Small Battery.

In reply to "H. T. B." in your current issue, he gives no facts about size except "small." To handle the problem effectively requires complete data of capacity of the cells, for a given period, and number and C.P. of lights.

For a few lights I should not regulate, though I appreciate that the brightness would vary.

If the dynamo runs all day every week day, and it is not practicable to have charging at a higher voltage, it would no doubt be cheapest to charge half at a time, and thus require only one resistance—but this requires knowledge of size of cell to estimate the value of such an economy—instead of two resistances suggested by "H. T. B."

I recommend integrating meters for input and output, and to avoid inaccuracies this would require three ampere-hour meters, one for discharge, and two for charge, one connected in each "half" (*i.e.*, 27 cells in series with one "charge" meter).

R. E. M.

London, *May* 16*th*, 1914.

An Artless Query.

The following amusing inquiry, which might interest some of your readers, was sent to our works referring to our advertisement for Century repulsion induction motors :—

We read your advertisement of the Century motors in the *American Exporter*, and shall be glad to receive your full range of illustrated catalogues quoting terms of business and the discounts allow.

You say therein that the motors are automatic in operation, and self-starting, and do not require any external starting device. Does it mean that—they do not require any electrical energy or oil engine to drive for the production of electricity, and if it be such, we shall be glad to hear from you by return your lowest price for a motor to produce electricity sufficient to light 50 lamps metallic-filament, and what would be the voltage of the motor.

If such a motor which can produce electricity without the aid of an oil engine or an electric current be available, which is long felt want here, we assure you that we can buy lot of such motors for the use of fans only where electricity or such big oil engines are not available.

We await you full information by return mail. Yours faithfully, (Signed) ——

Adnil Electric Co., Ltd.
R. A. Marples.

London, E.C., *May* 15*th*, 1914.

The Wiring of Government Buildings.

My attention has been drawn to a series of articles now appearing in the *Daily Herald*, stating that nearly all the public buildings down Whitehall are in hourly danger of fire owing to defective electrical installations. It is essential that inquiries should be made as to the truth, or otherwise, of these statements; yet, although I have searched the columns of all the daily papers, I can find nothing dealing with the subject, either by questions in the House or in the Press. These articles seem to bear the impress of truth, although the paper itself does not appeal to one, and yet nothing is done. We have M.P.'s in the House that are connected with our industry; surely they ought to inquire as to their truth.

If such statements are false, the persons responsible for them should be severely dealt with; if true, they are of such a serious nature, that the technical Press, the contractors of London, together with the general public, ought to press for an inquiry, and have the electrical installations of these buildings brought up to date. Friends of mine, whose business is in the Foreign Office, tell me the whole office is in a ferment, and they certainly speak as if quite a lot of the things spoken of in these articles are true.

B. S. Sykes.

Fulham, S.W., *May* 16*th*, 1914.

The King of Denmark.—The King of Denmark on Thursday of last week honoured the Great Northern Telegraph Co. w th a visit to their offices at St. Helen's Place, E.C., and went through the telegraph station there.

THE INSTITUTION OF ELECTRICAL ENGINEERS.

The *Journal* for May 15th contains the Report of the Council for 1913-14, which was to be presented to the annual general meeting yesterday. The Report shows that at May 1st, 1914, the membership amounted to 7,045 of all ranks, a decrease of 39 during the year. New members elected numbered 287, and 15 were reinstated; there were 110 resignations, 187 lapsed, and 44 deaths. On the other hand, 112 candidates for Associate Membership, including 70 non-members, have been approved subject to their passing the examination (the papers for which are published in the same issue). Premiums have been awarded as follows:—Mr. S. Evershed, Institution Premium; Mr. F. Lydall, the Ayrton Premium; Commandant G. A. Ferrié, the Fahie Premium; Mr. L. J. Hunt, the John Hopkinson Premium; Mr. B. Welbourn, the Paris Premium; Messrs. K. M. Faye-Hansen and J. S. Peck, S. H. Holden, and F. J. Teago, extra premiums; and Students' Premiums to Messrs. E. A. Richards and D. Dunham, H. S. Ripley, J. L. Thompson, J. L. Moffett, W. S. Flight, and A. Arnold and E. L. M. Emtage. A Salomons Scholarship has been awarded to Mr. C. H. Stubbings, and two David Hughes Scholarships to Messrs. J. G. Wellings and J. Mould. Regarding the Industrial Committee, the Report says:—

The Council have to report that the Industrial Committee has been dissolved.

This Committee was constituted on March 28th, 1912, and then consisted of six Members of Council, 12 members of the Institution not being necessarily Members of Council, and six other persons not been necessarily members of the Institution. On November 14th, 1912, the members of the Committee not being members of the Institution were increased from six to 12 in number. Representatives of the Tramways and Light Railways Association, the Association of Electric Power Companies, the British Electrical and Allied Manufacturers' Association, the Incorporated Municipal Electrical Association, the Conference of Chief Officials of the London Electric Supply Companies, and the Association of Municipal Corporations, accepted seats on the Committee.

The work of the Parliamentary Committee of the Institution which had hitherto dealt with legislative and similar subjects was transferred to the Industrial Committee.

The constitution of the Committee was framed so as to secure the widest representation of the industry, and with a view to the accomplishment of effective work by utilising the organisation and influence of the Institution. The powers conferred upon the Committee were very carefully considered with a view to the attainment of the maximum benefit from its operations, and the Council hoped for much good from the Committee's deliberations and recommendations. In common with other Committees of the Institution the Industrial Committee was required to report to the Council by whom such action would be taken as they might consider advisable. The constitution and powers of the Committee will be found in the annual report for 1911-12 (*Journal*, Vol. 49, p. 664).

Fourteen meetings of the Committee have been held, at which the matters considered were the Electric Lighting Bill (1912), the National Insurance Act, the draft Census of Production Schedules, and the Sheffield Corporation Bill (1912).

On March 9th last the Committee reported to the Council as follows:—

"The Industrial Committee have carefully considered the constitution of the Committee and the powers conferred upon it by the Council of the Institution.

"They are unanimously of opinion that it is not only desirable, but of importance to the electrical industry, that an organisation should exist which is capable of protecting and promoting the legislative and industrial interests of the industry, in so far as these interests are not already represented, protected, and promoted by the various existing Associations, and also for the purpose of co-ordinating and supporting the work of these sectional associations.

"They are of opinion that the present constitution and powers of the Industrial Committee are not such as to enable it to perform useful work. They are further of opinion that the views of the Council of the Institution should be ascertained as to whether it is advisable to enlarge the powers of the Industrial Committee and give it the necessary authority effectively to carry out the work referred to; or, alternatively, as to whether the Council be of the opinion that the consideration of these industrial questions is properly within the province of the Institution."

On the question of enlarging the powers of the Industrial Committee, the only additional powers would have been the granting of plenary authority to act independently of the Council, but no such extension of powers could be given, as the Council cannot wholly delegate to a Committee the powers or authority vested in them by the members of the Institution. Neither were the Council able to suggest any advantageous change in the constitution of the Committee, and in view of the opinion of the Committee as expressed in their report there was no alternative but to dissolve the Committee.

The Council take this opportunity to point out the grave difficulties which arise if questions are dealt with which involve matters of a political character or in regard to which the interests of various sections of the membership may be in conflict.

With regard to the Council's attitude towards industrial questions, the Council will in future, as in the past, within the provisions of the Memorandum of Association, take such action in respect of legislative or industrial matters as may conduce to the

general advancement of electricity and its applications, and will give full consideration to any representations made to them while preserving impartiality to all sections of the electrical industry.

The Report goes on to state that a number of Sectional Committees have been appointed to organise meetings at which specialised subjects can be discussed by members interested in those subjects. A sum of £500 has been placed at the disposal of the Research Committee for the current year. The receipts in connection with the Kelvin Memorial Window amounted to £1,691, and the expenditure to £1,223, leaving a balance of £468; this will be applied to the establishment of a Kelvin Gold Medal, to be awarded triennially as a mark of distinction achieved in engineering work of the kinds with which Lord Kelvin was especially identified.

The Council has appointed delegates to the International Illumination Commission, and a National Committee to take part in the work of the International Scientific Radio-Telegraphic Commission; and the Electrical Section of the Engineering Standards Committee, and of the British Electrotechnical Committee, has been reorganised.

The benevolent fund amounts to £4,642, an increase of £154, and the Wilde benevolent trust fund stands at £1,846. The income for the year amounted to £19,802, and expenditure to £15,410, leaving a surplus of £4,392; after transferring amounts to certain funds, there remained a balance of £2,834, compared with £1,238 in 1912. The assets amounted to £114,001, against liabilities £44,781, leaving a credit balance of £69,220, an improvement of £4,002. In February the catalogue of the lending library was issued to members containing 634 entries, and 306 issues of books were made in two months.

BUSINESS NOTES.

Bankruptcy Proceedings.—Mr. J. G. Forman, electrical engineer, Kilmun Cottage, Kilmun, Argyllshire, was examined in Edinburgh Bankruptcy Court in connection with the sequestration of his estate. Answering Mr. C. A. Romanes, chartered accountant, trustee on the estate, Mr. Forman said he served his apprenticeship with his father's firm in Glasgow. His father, who was Mr. James J. Forman, of Craigpark, Ratho, died in 1900. He was not assumed as a partner, but his brother was. He left his father's employment about a year prior to his father's death. His remuneration was £200 a year, and he had a free house. He went into the employment of another firm—Messrs. Hurst, Nelson and Co.—and received the same remuneration, in addition to expenses for a visit to South Africa on behalf of the firm. That visit took place in 1899, and he was there for about six or seven months. Over a year later he started business in Moffat on his own account, and left there in 1908. When his father died he received a share in his estate equal to between £300 and £400 a year. At present he was the holder of a patent for an internal combustion pump, which he undertook to hand over to the trustee, although he hoped this action would not interfere with its future value. He was at present in business in Kilmun as a consulting electrical engineer. The case was adjourned for a week.

T. L. Callender (Shamrock Cycle Co.), electrical engineer, residing at Nottingham, lately trading at St. Heliers, Jersey. Last day for proofs for dividend, May 30th. Mr. E. Wynne Humphrey, trustee, 4, Castle Place, Park Street, Nottingham.

W. H. Pease, electrical engineer, lately carrying on business at Scarborough and Doncaster, appeared for his public examination. According to his statement of affairs, debtor's liabilities expected to rank for dividend amounted to £771, and his available assets totalled £251. The debtor had not furnished a proper cash and goods account, and the examination was adjourned in order to enable him to do so.

W. Barnett, electrician, 269, Mile End Road, E.—Trustee (Mr. E. Leadam Hough, Bankruptcy Buildings, Carey Street, W.C.), released May 5th.

F. W. Suter, engineer and company director, 67, St. John's Park, Upper Holloway, N.—Trustee (Mr. E. S. Grey, Carey Street, W.C.), released May 11th.

H. G. Prested, electrical engineer, St. John's Park, Holloway.—Trustee (Mr. E. S. Grey, Carey Street) released May 5th.

The Printing Trades' Exhibition.—The Exhibition now being held at the Agricultural Hall, Islington, is considered to be the best of its kind which has been held, and so far as the display of printing machinery and accessories is concerned there is no doubt that this is the case. All the machinery which is at work is driven in some way or other by means of electric motors, and while the various electrical applications are interesting, there is very little of conspicuous novelty. One of the most imposing displays of machinery is that by Haddon & Co. in the small hall near the entrance, and this has been appropriately named "Haddon Hall." In this hall is to be seen also the best display of electric motors and switchgear, these being supplied by J. H. Holmes & Co. The machines are practically all individually driven and are equipped with automatic starting switchgear. On some of the machines is a very complete control equipment, Messrs. Holmes having adapted their rotary push button control to flat bed machinery. The control panel contains a solenoid starting switch, main clapper switch, D.P. switch and field regulator, with interlocking field contacts which ensure the shunt regulating resistance being brought in gradually after the starting resistance is cut out. The push button box contains in addition to starting and stopping pushes an inching push for obtaining slow speeds when making ready. When this push is pressed, the clapper switch closes the main circuit, but immediately breaks it again on the starting rheostat cutting out the first step of resistance, hence so long as the push is pressed the clapper switch rapidly makes and breaks contact, and so effects all the inching motions necessary without any other effort on the part of the operator. A safety push is also provided which, when depressed, prevents anyone starting up the machine. We hope to refer to some of the other exhibits in our next issue.

Catalogues and Lists.—India-Rubber, Gutta-Percha and Telegraph Works Co., Ltd., Silvertown.—Catalogue No. 36 of 84 pages is devoted to Silvertown insulators, fittings, and tools for telegraph and telephone lines. Starting with iron and creosoted wood poles and structures for telephone exchanges, it particularises wires, cable suspenders, stay rods, galvanised brackets, insulators and supports for same, Post Office pattern pot-head insulators, iron hooded, ebonite, glass shackle, bobbin, reel, and other insulators, cleats, telegraph linemen's tools, &c., and several pages of diagrams show various leading-in methods employed by the Post Office.

The Cable Accessories Co., Ltd., Britannia Works, Tividale.—Forty-eight-page illustrated brochure specially prepared for borough electrical and other engineers concerned with matters relating to public lighting. The firm specialises in lanterns for the electric lighting of public places, and in this publication it shows a range of fittings to take half-watt lamps. In addition to illustrations of the fittings, pictures also appear of streets, railway stations, &c., in various cities in Great Britain where they are in service.

The Western Electric Co., Ltd., North Woolwich.—Booklet No. 105 (revised edition, 12 pages) contains particulars of the improved Blue Bell dry cell and tests thereof made at the National Physical Laboratory. Prices are tabulated.

Messrs. A. Reyrolle & Co., Ltd., Hebburn-on-Tyne.—Revised pamphlets Nos. 114 and 144. The former deals with standard wall plugs, the prices of glands used in connection with which have been reduced. The latter shows oil switches for three-phase (50 amperes 500 volts), the prices of which have also been considerably reduced.

Mr. C. Franklin Tubbs, 2, Craven Terrace, Carlton Hill, Leeds.—Brief particulars, many illustrations and tabulated prices of "Nonpareil" oil immersed and other starters, A.C. brake solenoids, oil switches, single-phase starters, resistances and other manufactures of this firm are given in a series of publications just issued in an expanding cover.

The Electrical Co., Ltd., London.—The *E.C. Journal* for May has been issued. Among other articles we find a description of the A.E.G. high-tension factory and some notes on the manufacture of A.E.G. rubber-insulated wires.

Messrs. J. H. Holmes & Co., Newcastle-on-Tyne.—Pamphlet No. 71 contains illustrated particulars and prices of the "Castle" ammeters and voltmeters, portable testing sets, and other measuring instruments.

Mr. H. Lanz, 63, Queen Victoria Street, London, E.C.—Four-page circular giving half-tone views and test particulars of superheated locomobiles made at Mannheim.

The Armorduct Manufacturing Co., Ltd., 6, Farringdon Avenue, London, E.C.—Priced leaflet giving particulars of the "Scru-grip" continuity fitting.

Book Notices.—The publishers of Sell's "Directory of Registered Telegraphic Addresses," after a long correspondence with the Postmaster-General of the Commonwealth of Australia, have obtained official authority to publish the list of firms in Australia using registered cable addresses, and arrangements have been made for the names, together with the postal and cable addresses and other particulars, to appear in the next volume (1915) of Sell's Directory.

From Mr. Fritz Pauli, of Berlin, we have received a reprint of a long article in "Süd und Mittel-Amerika," of March 20th, on the development of the Telefunken system of wireless telegraphy in Latin America. The article is fully illustrated, and indicates that the system named has been adopted in the great majority of instances; a map is given showing the distribution not only of the Telefunken stations, but also of those installed by other concerns—a total of 365 (including ship installations)—and several of the Marconi stations are illustrated, the sectional hollow masts of the latter contrasting with the open triangular trellis construction usually adopted by the Telefunken Co.

"*Journal* of the Institution of Electrical Engineers." Vol. LII, No. 234. May 15th. London: E. & F. N. Spon, Ltd. Price 3s. 6d.—This issue contains papers on "Electrification of Railways as affected by Traffic Considerations," by H. W. Firth; and "The New Central Telegraph Office, Calcutta," by C. T. Williams, as well as the Report of the Council for 1913-14, Annual Accounts, and the papers set in the examination for Associate Membership.

"Electric Wiremen's Work," by J. H. Havelock. "Modern Workshop Practice," by E. Pull. London: Crosby Lockwood and Son. Price 5s. net each.

"*Engineering* Directory." April. London: *Engineering*, Ltd. Gratis.

"*Proceedings* of the American Institute of Electrical Engineers.' Vol. XXXIII, No. 5. May. New York: The Institute. Price $1

"*Transactions* of the New York Electrical Society." New Series Nos. 1 to 6. 1912. New York: The Society.

Seaside Illuminations.—Now is the time for the authorities of popular seaside resorts to prepare attractions for their summer visitors. A good example is set by Hastings, where the bandstand and front have been illuminated with no fewer than 4,000 metallic-filament lamps, producing an excellent spectacular effect at night. The lamps used are the Pope "Elasta" British-made wire lamps, and appear to suffer no ill-effects from their exposed position.

Liquidations.—The Hove Electric Lighting Co., Ltd.—A meeting of creditors is called for May 25th. Claims must be sent to the Liquidator, Mr. F. R. Reeves, Salisbury House, E.C., by May 22nd.

Measures Bros., Ltd., 53b, Southwark Street, S.E.—Liquidator (H. de Vaux Brougham, 33, Carey Street, W.C.), released May 8th.

Trade Announcements.—Messrs. E. Oakley & Co., 38, Broad Street, Poland Street, London, W., have been appointed sole concessionnaires for the British Isles for the Deaco electric starting and lighting equipments for motor-cars.

Messrs. J. W. Greenwood & Co., electric lamp makers, Halifax, are declining business. In consequence the stock, plant, &c., are to be disposed of by auction on May 27th.

The Brimsdown Lamp Works, Ltd., have taken up the sale of special glass shades in conjunction with their Wirum lamps.

Messrs. Jas. J. Niven & Co., Ltd., have removed to 38, Lime Street, E.C.

New Underground Posters.—The Underground Co. has just issued a new series of 10 picture posters, designed in a style in general use on the Continent, but thus far little adapted for poster work in this country. They are from the brush of Paul Reith, a young German artist of the Munich Art School, and are good examples of three and four-colour work. The posters, which deal with Hampton Court, Uxbridge, the Riverside at Kew, a Barge Scene on the Brent, Box Hill, Stoke Poges Church, Epping Forest, and so on, will be displayed on the motor-'buses and the tramcars with which the Underground is associated.

Thermit Welding.—Messrs. Thermit, Ltd., London, have recently taken over the entire control of the "Thermit" patents in South Africa and India, and their chief engineer will in July proceed on an extended tour in these countries with a view to the development of the business, more especially as regards the welding of tramway rails. The company are also sending out one of their welders with the necessary plant to enable practical demonstrations of the process to be given on every system in both countries. The tour is expected to extend over a period of about nine months.

For Sale.—Messrs. Electro-Bleach and By-Products, Ltd., have for disposal a number of gas engines, dynamos and producers. Eastbourne Borough Electrical Engineer invites tenders for the purchase of arc lamps and accessories, and meters. Particulars will be found in our advertisement pages to-day.

Denmark. — The Danish Customs authorities have recently given a decision to the effect that "transformers consisting of a closed iron receptacle, stated to contain oil, copper wire, insulated parts, &c.," are to be classified under No. 301 of the Tariff, the duty being 7½ per cent. *ad valorem.*

Patent Restoration.—An order has been made for the restoration of Patent No. 18,866 of 1910, for "Hydraulic air compressor or pump," granted to Otto Heldebert Mueller.

LIGHTING and POWER NOTES.

Ashton-under-Lyne.—Works Extension Completed.—The new turbine and boiler plant extensions at the electricity works, which have cost £50,000, have been completed, and are to be thrown open for public inspection.

Atherton.—Mill Driving.—The U.D.C. has agreed to supply electricity for power purposes to the Laburnum Spinning Co.'s new mill for a period of not less than seven years, subject to sanction by the L.G.B. to a loan to meet the cost of the necessary mains.

Australia.—The Sydney City Council has been recommended by its E.L. Committee to invite offers for the acquisition by the Council of a property containing coal, which must be situated within 70 miles of Sydney, either on a waterway or within ten miles of a railway, for the use of the electricity department. The electrical engineer reported that the coal bill this year will amount to £35,000, the greater portion of which is represented by the cost of haulage, and it would be economical in the future for the Council to establish a generating station, containing very large units, on the coalfield, and transmit the energy to Sydney.—*Australian Mining Standard.*

Barnes.—Year's Working.—The net profit of the U.D.C. electricity undertaking for the year ended March 31st last was £2,353, an increase of £362 over the previous year. Generating costs decreased from '81d. per unit to '75d. per unit. Of the profit, £1,000 has been placed to the reserve fund, and £1,000 to the relief of the rates.

Barnsley.—Year's Working.—The annual report of the electrical engineer states that the units sold during the past year numbered 2,200,057, as compared with 2,055,570 in the previous year. The consumers connected total 1,215, as against 1,142, the equivalent in 8-c.p. lamps being 98,571, as against 91,427. The net profit was £1,469, which, with the reserve fund, makes £2,870 to be carried forward. The engineer intends, at an early date, to present a report on the plant at the electricity works, and the necessity of further extensions.

The Corporation proposes to apply to the B. of T. for authority to supply electricity in Vernon Road and to the Mount Vernon Sanatorium. The Worsborough U.D.C., which was asked to consent to the proposal, has adjourned the matter for three months.

Birmingham.—Year's Working.—The receipts of the Corporation electricity undertaking for the year ended March 31st, 1914, amounted to £346,561, compared with £300,596 in the previous year. The units sold numbered 73,767,178, against 63,250,492. The net balance was £44,634, of which £19,500 has been carried to the renewals fund, and it is proposed to place £25,134 to the relief of the rates. During the year the capital account has been increased by £160,123, including £13,567 for new buildings, £75,382 for plant, and £66,222 for mains and services, and now stands at £2,156,207.

Proposed New Mains.—The E.S. Committee has recommended the T.C. to apply for sanction to a loan of £150,000 for new E.L. mains.

Blean.—Proposed E.L.—The Whitstable E.L. Co. has applied to the Blean R.D.C. for permission to erect overhead wires to supply electricity outside the area. The R.D.C. has requested its surveyor to confer with the company's engineer on the matter, and report.

Bolton.—Rate Relief.—The Electricity Committee has decided to transfer £2,000 from the profits of the department to the relief of the rates.

Bradford-on-Avon.—Prov. Order.—The B. of T. has granted a prov. order for E.L. to Mr. J. H. Edwards, of Bristol. The area of supply includes the urban district and Limpley Stoke, Westwood, Winsley, Bradford Without, and Holt, in the area of the R.D.C.

Bury.—Overhead Wires.—The T.C. has applied to the B. of T. for permission to use overhead wires in parts of the borough for the transmission of electricity at 6,600 volts.

Street Lighting.—A sub-Committee of the Lighting Committee has been appointed to consider the automatic lighting of street lamps.

Castle Eden (Co. Durham).—E.L. Scheme.—The P.C. has adopted an electric lighting scheme, and is to take a supply of current from the Wingate Colliery Co., at £2 per light per annum, the company erecting poles and wires. The company has also undertaken to supply private dwellings at 4d. per unit.

Continental Notes.—Hungary.—What is stated to be the first large overland electricity generating station in Hungary is about to be established at Pancsova, to supply current to about 15 small towns, and for agricultural power purposes.

Russia.—The Kharkov Section of the Russian Technical Society is arranging to hold an Electrical Exhibition in the city of Kharkov towards the end of the present year. It is intended to provide sections to demonstrate the applications of electricity to mining, to small industries, to household uses, central station purposes, &c.

Italy.—The Società Imprese Idrauliche ed Elettriche del Tirso has been formed at Leghorn for the utilisation of the water power of the river Tirso, on the island of Sardinia. The share capital provisionally amounts to £140,000, capable of being increased to £480,000, and the chief undertakings interested in the scheme are the Banca Commerciale and the Italian Southern Railway Co. It is proposed to build a large dam on the river and erect plant of 20,000 h.p., and power is to be supplied to the mines in the island. The Government has granted fiscal facilities to the undertaking and financial support, and the works will pass into the possession of the State, free of charge, at the end of 45 years.

Cranbrook.—Proposed E.L.—Messrs. Saunders & Co. have approached the R.D.C. with reference to E.L. schemes for Hawkhurst and Cranbrook, and a committee has been formed to consider the question in consultation with representatives of the respective Parish Councils.

Darwen.—Year's Working.—The net profit on the Council's electricity department for the past year was £972, of which £500 has been contributed to rate relief. The units generated numbered 2,114,000, and the power load nearly doubled during the year.

Devonport.—Year's Working.—The gross profit on the Corporation electricity department for the past year was £7,878, and after paying £3,938 for interest and £3,894 to the sinking fund, the net balance of £46 has been carried to the reserve fund.

Dover.—The Postal authorities have asked the T.C. to quote terms for electricity supply to the new post office, with an anticipated consumption of 10,000 units per annum, but without any guarantee for a minimum quantity. The engineer suggests 5d. per unit for lighting and 2½d. for power for one year, and the Electricity Committee has left the matter in his hands to deal with at his discretion.

The Committee has decided to charge a minimum of £30 a year, with 2½d. per unit for current consumed, and if the demand exceeds 5 KW. to charge £6 extra for each KW. supplied, for a stand-by supply at the Hippodrome.

Dundalk.—L.G.B. INQUIRY.—An inquiry was held on May 12th by Mr. P. C. Cowan into the application of the U.D.C. for sanction to borrow £20,000 for extensions to the electricity undertaking. The Council has agreed to supply the locomotive works of the G.N. of Ireland Railway Co. at 9d. per unit up to 480,000 units, and 7d. per unit in excess of that amount, with a minimum account of £1,800 per annum. The application was opposed by the Dundalk Gas Co.

Edinburgh.—PUBLIC LIGHTING CHARGES.—According to a statement made to the T.C. by the treasurer, the E.L. Committee proposes during the coming year to spend an additional £59,250 on capital account, £30,000 of which is the first instalment for the new generating station at Portobello. This necessitates an addition of £5,925 to the reserve fund. The estimates show that the Committee expects its ordinary revenue and the revenue from the reserve fund investments to provide for the whole expenditure during the year, and also for the £5,925 required for the reserve fund, and leave a surplus at the end of the year of nearly £5,000. The treasurer said in the face of the large surplus, it was difficult to see how the Committee could maintain the existing charge of £9 per lamp for street lighting in view of the competition of high-pressure gas, which was offered at a much lower figure. Undoubtedly the cost might be considerably reduced by substituting equally powerful gas lamps for E.L., and it was quite clear the Corporation would have to obtain much better terms from the E.L. Committee, or the Committee would lose one of its best customers. Notice of motion was given that it be remitted to the E.L. Committee to consider the charge for electricity for public lighting as from May 15th, and report.

Ellon.—E.L. SCHEME.—The agreement between the T.C. and Mr. James Duncan, of Tillycorthie, in connection with the latter's E.L. scheme having been adjusted, Messrs. T. C. Smith and Co., of Aberdeen, are to start immediately with the wiring of the houses, and the whole scheme is to be finished by September.

Folkestone.—HALF-WATT LAMPS.—The T.C. has accepted the offer of the Electricity Co. for lighting the East Cliff with six 700-C.P. half-watt lamps, at £84 per annum.

Gravesend.—LOANS SANCTIONED.—The T.C. has received from the L.G.B. sanction to the following loans in connection with the electricity undertaking:—£650 for buildings and foundations; £1,600 for cables and street works; and £11,000 for machinery, plant, &c. The latter sum is to be amended, as it should be £12,500, the amount applied for at the inquiry.

Greenock.—NEW PLANT.—The new 5,000-KW. Westinghouse-Rateau steam turbo-generating set at the Dellingburn power station was started up last week. At the ceremony it was stated that it was proposed to supply current to Port-Glasgow at a pressure of about 10,000 volts, and it was expected that the shipbuilders would take their whole supply from the Greenock T.C.

Harrogate.—The Lighting Committee has granted a number of salary increases to employés of the electricity department. It was also decided that the staff at the works on duty on Bank Holidays shall be paid at the rate of time and a half, and that any of the staff at the works working overtime on account of the illness of a fellow workman shall be paid the ordinary Trade Union rate of pay for overtime.

Hereford.—YEAR'S WORKING.—The revenue of the Council's electricity department for the year ended March 25th, 1914, was £7,229, compared with £6,516 for the previous year. The units sold numbered 840,939, against 600,217, the increase being mainly for power.

Inverurie.—PROPOSED E.L.—The G.N. of Scotland Railway Co. has quoted 3½d. per unit for a supply of electricity to the town.

Keith.—PROPOSED E.L.—The company at present installing electric light in Lossiemouth, has been requested to submit three alternative methods for the generation of electricity in the town, *i.e.*, by suction gas, crude oil and steam.

Kettering.—NEW LOANS.—The U.D.C. has taken up loans in connection with the electricity undertaking of £1,000 for assisted wiring, £1,400 for mains extensions, and £600 for services.

Leeds.—PROPOSED LOAN.—The Finance and Parliamentary Committee has resolved to apply to the L.G.B. for sanction to the borrowing of £200,000 for extensions at the electricity works, and the purchase of land in Whitehall Road, and £12,000 for the purchase of land in South Accommodation Road, and the necessary works to adapt it for the purpose of the electricity undertaking. The Tramways and Electricity Committee has decided to supply current for the charging of the batteries of electric vehicles at 1d. per unit.

ANNUAL ACCOUNTS.—The financial returns for the Corporation electricity undertaking, which have just been published, show total receipts for the past year £144,925, working expenses amounting to £53,017, and a gross profit of £91,907. After meeting capital charges, the net profit was £14,315, which compares with £15,508 in 1912-13. If, however, allowance is made for expenditure of a capital nature out of revenue (which is increasing year by year), the surplus would be £21,298, as against £18,261 in 1912-13. During the year over 31 million units were sold, an increase of 7,880,000 units on the previous year; power and heating accounted for 19 million units, the aggregate H.P. of motors in use being 26,842, and of heating apparatus 966 KW. The maximum load was 13,880 KW., as compared with 10,715 KW., the generating plant capacity being 22,940 KW., which will shortly be increased to 30,440 KW. Ordinary generating and distribution costs amounted to 42d. per unit, capital charges, &c., bringing up the total cost per unit to 1·01d., as against the average price received of 1·12d. The average units sold per 35-watt lamp installed were 19·24, and per H.P. (motors and heating) 709, giving revenues of 4s. 3d. and £2 8s. 5d. respectively.

Leigh.—L.G.B. INQUIRY.—Mr. H. R. Hooper has held an inquiry into the T.C.'s application for sanction to borrow £10,225 for extensions at the electricity works. No opposition was raised.

London.—The L.C.C. has been recommended by its Finance Committee to sanction the following loans for electricity purposes:—Hackney B.C., £15,750 for plant extensions; Stepney B.C., £15,000 for mains extensions; and Woolwich B.C., £542, for the electricity undertaking.

L.C.C. ELECTRICITY COMMITTEE'S REPORT.—Considerable discussion occurred on the submission of an estimate of £3,500 to the Council, in respect of expenses for the current year in connection with the work of the Special Electricity Committee. It was contended that the whole question of the supply of electricity in London was a matter of extreme urgency, and the Committee should take the earliest opportunity of presenting a comprehensive report, so that the matter might be discussed in detail by the full Council. Practically, the only point of importance, however, which emerged, was a statement by the chairman of the Committee that it was intended to present a scheme to Parliament next session, and that an opportunity would be afforded the Council of fully discussing its provisions.

HAMPSTEAD.—PLANT AND MAINS EXTENSIONS.—The B.C. has decided to install additional plant at the electricity works, at a cost of £7,600, and to extend the E.L. mains from Quex Road Road to the Kilburn Empire, at an estimated cost of £2,604.

BETHNAL GREEN.—The Council, after considering the E.L. Committee's recommendation to appoint Mr. Snell as consulting engineer, has decided to advertise for an electrical engineer at a fee of not more than 500 guineas.

ISLINGTON.—L.G.B. INQUIRY.—Last week Mr. T. C. Ekin held an inquiry into the application of the Guardians to install electric lighting in certain of their institutions and offices, at a cost of £3,600. Various estimates for E.L. costs were given by Mr. Enright, as consulting engineer to the Guardians, and by Mr. H. L. Dykes, of Messrs. Handcock & Dykes, while Mr. Goodenough, of the Gas Light and Coke Co., explained the offers of the Gas Co., and incidentally criticised those for electric lighting. The B.C. had agreed to supply the Guardians at the rate of 2d. a unit for a minimum of 125,000 units during five years.

Mold.—PROPOSED PROV. ORDER.—Mr. A. O. Griffiths, of Caergwrle, has informed the U.D.C. that he intends applying for a prov. order for E.L., and to form a company for working the same.

Newport (Fife).—PURCHASE PROPOSAL REJECTED.—The T.C. has decided not to take over the undertaking of the Tayside Electric and Gas Light Co., which supplies electricity in Wormit, now amalgamated with Newport.

Portrush (Co. Antrim).—PROPOSED E.L.—The U.D.C. has decided to appoint Messrs. J. Woodside & Co. as electrical engineers to the proposed electricity works.

Pudsey.—MILL DRIVING.—Messrs. Richard Ingham and Co., Ltd., spinners, of Crawshaw Mills, are considering whether the textile plant in their proposed new extension shall be driven by electricity or steam.

Redditch.—RECONSTRUCTION SCHEME.—The U.D.C. has adopted the scheme of Messrs. Handcock & Dykes for the reconstruction of the electricity works, and has decided to apply to the L.G.B. for sanction to borrow £18,000 for the purpose. The engineers' original report has been varied, in that a single-phase system, instead of three-phase, is to be adopted for the extensions.

Rothesay.—At a meeting of the T.C. last week it was stated that the whole of the E.L. plant required renewing; the matter will probably come before the next meeting.

Scarborough.—E.L. PURCHASE DEFERRED.—The T.C. has decided to take no further steps at present with respect to the purchase of the undertaking of the Scarborough Electric Supply Co.

Slaithwaite (Yorks).—Proposed E.L.—The U.D.C. has appointed a deputation to interview the Huddersfield electrical engineer, with regard to the construction of an electric lighting plant.

South Africa.—The Worcester (Cape Province) hydro-electric scheme has been sanctioned by the Government; the estimated cost is £15,000, and work is expected to commence next August.

The Port Elizabeth T.C. proposes to borrow £50,000 for extensions to its electric lighting plant and mains.

Springhead (near Oldham).—Proposed E.L.—The U.D.C. has asked the Oldham T.C. upon what terms it would supply electricity to the district.

Stockport.—L.G.B. Inquiry.—An unopposed inquiry was conducted on May 13th, by Mr. H. R. Hooper, into the application of the T.C. for sanction to the borrowing of £17,609, for the extension of the electricity undertaking. In the course of the proceedings, Mr. Hooper commented on the wisdom of devoting the profits to the provision of new machinery, rather than borrowing for that purpose.

Sunderland.—Loan Application.—The T.C. has approved of the expenditure of £21,972 upon sub-stations and mains in connection with the distribution of electricity, and has sanctioned an application to the L.G.B. for power to borrow £50,000, to be expended upon mains.

Swinton.—Proposed Loan.—The U.D.C. has applied for sanction to a loan of £1,500 for electricity purposes.

The electrical engineer has been instructed to report on the question of the renewal or otherwise of the bulk supply agreement between the Council and the Lancashire E.P. Co., and also on the conversion of the present system to a three-phase alternating system.

Tasmania.—The report of Mr. E. Parry, on the electrical scheme of the Hydro-Electric Power and Metallurgical Co., has been presented to the Government, and is generally in favour of Government purchase. In regard to the potentialities of the Great Lake, the report states that the rainfall would produce an average of 150,000 H.P., and a maximum of 700,400 H.P., which would probably be sufficient, with the increased storage conditions, to supply 400,000 H.P. The expenditure on the scheme to date amounts to £136,797, and the estimated cost of completing the work so as to supply Hobart is £96,449, to which £17,500 for interest on construction, and £41,450 for administration, should be added. Mr. Parry is of opinion that the whole of the energy can be disposed of in Hobart and district, for which mains extensions, estimated to cost £35,000, will be required, making a total expenditure of £300,572, equivalent to £35 12s. per H.P. for generating plant. The cost of additional plant, buildings, headworks, and transmission lines to the West and North-West Coasts, is estimated at £268,900.—*Australian Mining Standard.*

Torrington.—Proposed E.L.—The T.C. has referred the question of the electric lighting of the town to the Lighting Committee for consideration.

Waltham Abbey.—Proposed Prov. Order.—The Waltham Abbey and Cheshunt Gas Co. has asked the U.D.C. if it would support an application by the company for a prov. order for E.L. at Waltham Cross and district. The Council has appointed a deputation to discuss matters with representatives of the company.

Watford.—L.G.B. Inquiry.—Mr. T. C. Ekin held an unopposed inquiry last week into the application of the U.D.C. for power to borrow £15,150 for the extension of the electricity supply to the districts of Abbots Langley, Watford Rural District, Aldenham and Bushey Urban District, which have been added to its area.

Wolverhampton.—Electrical Exhibition.—The T.C. has confirmed a proposal of the Electricity Committee to hold an electrical exhibition at the forthcoming floral fete in the West Park, at a cost not exceeding £200.

An E.H.T. main is to be laid from Pountney Street to Goldthorn Hill pumping station, and other necessary work is to be carried out at the station at a cost of £875.

Worcester.—Sewage Pumping.—The T.C. has appointed the city engineer and the electrical engineer to report on the advisability of using gas or electric power for driving the pumps and compressor at the sewage works. At the last meeting of the T.C. the Sewerage Committee recommended the installation of a suction gas plant in place of electricity, at a cost of £711, estimating that a saving of £790 per annum would be effected; this figure was criticised by several speakers. The Sewerage Committee at present pays 1½d. per unit for electricity; if all its power were electrical it could be supplied at ½d. per unit.

Street Lighting.—The lighting of New Road is to be converted from gas to electricity.

TRAMWAY and RAILWAY NOTES.

Accrington.—Year's Working.—The revenue of the T.C. tramways for the year ended March 31st last amounted to £30,194, and the working expenses to £17,511. The net surplus was £4,733.

Aldershot and Farnborough.—An extension of time until June 4th, 1915, for the commencement or completion of the works under the Aldershot and Farnborough Light Railway Order, 1909, has been applied for by the Light Railway Co.

Birmingham.—Tramway Fares.—A report by Mr. Baker, general manager of the T.C. tramways, on the suggested readjustment of the tramway fares, states that from the financial point of view, ½d. fares are a mistake. It might be possible for Birmingham to institute ½d. fares on a limited scale, if the workmen's return tickets were abolished, but if the two were working together the profit on the undertaking would be wiped out. The 1d. fare is the backbone of the Birmingham undertaking, and to decrease the number of 1d. fares would almost certainly result in disaster. The report states that 42 per cent. of the passengers travelled less than half of the 1d. stage, and if ½d. fares were in vogue the receipts would be reduced by upwards of £90,000, to recover which 43 million additional passengers would be required.

Bolton.—Rate Relief.—It has been decided to contribute £17,500 from the profits of the tramway undertaking to the relief of the rates.

Clifton (Lancs.).—The Salford T.C. has informed the Kearsley D.C. that it cannot see its way to connect its tramway system with that of the South Lancs. Tramways Co., and the two systems will, therefore, still be separated by about 200 yards at Clifton.

Darwen.—Year's Working.—The total receipts of the T.C. tramways for the past year amounted to £14,646 on the Darwen section, and £2,145 on the Hoddlesden section. The net profit on the Darwen section was £773, and on the Hoddlesden section there was a loss of £325. The car-mileage was: Darwen 230,545, Hoddlesden 36,367.

Dundee.—Tramway Purchase.—The Dundee, Broughty Ferry and District Tramway Co. has informed the T.C. that it is prepared to sell the section of its tramways, about 1,540 yards in length, which the T.C. is to take over in August, for £15,480. The T.C. tramways manager has been instructed to report on the matter, and to prepare an estimate of what the T.C. ought to offer.

Glasgow.—Following exhaustive reports by the manager of the tramways and the chief engineer of the electricity department, the T.C. has been recommended to adopt a proposal that the Pinkston power station be left under the control of the tramways department, provided that the present arrangements be continued, whereby each department can get, by means of the interconnecting cables between Pinkston and Port-Dundas stations, whatever supply of energy can be spared whenever assistance is required by either department from the other.

London.—Bethnal Green.—The B.C. has been recommended, in consideration of the L.C.C. undertaking reconstruction, widening and paving works in Grove Road, not to oppose any further application the C.C. may make for the construction of overhead electric tramways in that road.

L.C.C.—Replying to Mr. Kellaway in the House of Commons, Mr. Burns stated that an inspecting officer of the Board of Trade visited the scene of the accident on the L.C.C. tramways on the Embankment on May 11th, and he was now considering his report with a view to deciding whether a formal inquiry was necessary.

The L.C.C. has obtained reductions amounting to £48,600 in the assessments of its tramway undertaking, on the ground of reduced earnings. The Islington B.C., however, has been able legally to uphold the view that the reduction is not warranted, and the Highways Committee has recommended the Council to take the matter to the House of Lords for final decision. The assessments have been reduced in 45 out of the 48 parishes.

The first of the new 8,000-KW. turbine sets at the L.C.C. Greenwich generating station will be officially started up on Wednesday next.

Mansfield.—Traction Supply.—The Electricity Committee has, subject to confirmation by the T.C., arranged to supply energy to the Mansfield and District Light Railway Co. at 1¼d. per unit for the first 400,000 units per annum, and 1d. for every additional unit. The agreement is to be for five years.

Morecambe.—Year's Working.—The revenue of the tramways undertaking last year amounted to £10,082, and the gross profit to £4,005. The net surplus was £2,184, compared with £683 in the previous year. It has been decided to allocate £1,500 to the rates and to carry forward £683.

New Zealand.—The surplus on the working of the Wellington tramway system for the past year was £3,894, compared with £11,903 in the previous year, the decrease being due to alterations to cars, costing £12,529, which were carried out during the year. The surplus on the Christchurch tramways was £6,805, compared with £2,982.

Southampton.—Year's Working.—The receipts from the T.C. tramways during the year ending March 31st last amounted to £67,672, as against £64,185 in 1913. The current consumed totalled 1,971,261 units, an increase of 6,457 units.

Warrington.—Year's Working.—The income of the T.C. tramways undertaking for the year ended March 31st last amounted to £23,753, and the expenditure to £15,217. The net profit was £3,239, of which £2,500 is to be devoted to the relief of the rates, and £739 is to be carried forward. On the motor-omnibus service there is a gross profit of £405, and a balance of £336.

Worsley.—The U.D.C. has decided to write to the local M.P. drawing attention to complaints respecting the condition of the cars and the overcrowding of the South Lancashire Tramways Co.'s route, and asking him to approach the B. of T. or take other steps to secure an inquiry into the matter.

TELEGRAPH and TELEPHONE NOTES.

Wireless Telegraphy.—The Marconi Co. recently gave a demonstration of wireless telegraphy at 100 words a minute between Chelmsford and Letterfrach, Co. Galway, and the Postmaster-General proposes to adopt this method of working between a new station near Stonehaven and a Post Office station near Newcastle-on-Tyne, as a stand-by in the event of interruption of the overland wires.

Wireless Telephony.—It is reported that a successful experiment in wireless telephony has been made between the German wireless station at Nauen and the Austrian port of Pola, a distance of 850 km.

Wireless Fog Guns.—According to the *Daily Telegraph*, the Marconi wireless control apparatus installed by the Clyde Lighthouse Trust at Gourock, from which signals are operated at Fort Matilda and on a buoy in the fairway, is said to be working well. The apparatus has been combined with the Stevenson-Moyes automatic acetylene fog-gun. This has been erected on an isolated beacon in mid-sea, and has not only been left unattended for weeks on end, but has during this time been exposed to all weathers and to the "jamming" from strong wireless signals received from ships passing close at hand. The tests have been in every way satisfactory, the gun, when the wireless control is switched on in the coastguard station where the transmitting apparatus is set up, firing at intervals of about 20 seconds and giving both a loud report and a brilliant flash. There is a sufficient supply of acetylene gas in the "gun" to allow of continuous firing, at the rate of three flashes and reports per minute, for from two to three weeks. It is expected that the same apparatus with slight adaptations will be utilised for mine and railway work, and for blasting purposes.

CONTRACTS OPEN and CLOSED.

OPEN.

Australia.—Sydney.—July 20th. Box compound, meters, maximum-demand indicators, arc lamp carbons, and straight-stem insulators, for the Council. Specifications for each section 10s. 6d., from City Electrical Engineer, Town Hall.

July 8th. N.S.W. Railways and Tramways Department. One battery booster set to Specification No. 453. Specification (2s. 6d.) from the Electrical Engineer's Office, 61, Hunter Street, Sydney.

Victorian Railway Commissioners.—August 26th. Electric cranes. Specifications at the Railway Offices, Spencer Street, Melbourne, and at the Board of Trade Commercial Intelligence Department, London.

Melbourne.—June 3rd. Sixty tubular steel tramway poles, concentric lead-covered cable. City Council. See "Official Notices" to-day.

Hobart.—July 20th. Telegraph and telephone material, for Postmaster-General. See "Official Notices" to-day.

Perth.—July 22nd. Telegraph and telephone material, for Postmaster-General. See "Official Notices" to-day.

July 1st. 360 accumulators, Tudor type, for Postmaster-General. See "Official Notices" to-day.

August 5th. Copper wire and binders, for Postmaster-General. See "Official Notices" to-day.

Austria.—Vienna.—June 15th. Supply of arc lamp carbons for the year, January 1st to December 31st, 1915, to the K.k. Nordwestbahn-Direktion. Particulars and forms from the Abteilung für Bahnerhaltung und Bau der K.k. Nordwestbahn-direktion, Vienna.

Bedford.—May 28th. Steam and other pipe-work, f the Corporation Electricity Department. Mr. R. W. L. Philli Electrical Engineer.

May 28th. Coal (about 9,600 tons) for the Corporation Electricity Works. Mr. C. Stimson, Town Clerk.

Belfast.—June 2nd. Corporation. 45,000 tons of washed single nuts and lighterage for the Tramways and Electricity Committee. Forms of tender from Mr. T. W. Bloxam, City Electrical Engineer, East Bridge Street.

Belgium.—The municipal authorities of the little town of Olne (Province of Liége) have just invited tenders for the concession for the supply of electrical energy for private and public lighting and power purposes.

May 28th. Municipal Council. Electric lighting installation for three sheds at the Canal Dock. Deposit £40. A copy of the cahiers des charges can be seen at the Board of Trade (Com. Int. Dept.) in London.

May 30th. The Belgian Post and Telegraph authorities in Brussels (Salle de la Madeleine). Supply and laying of a quantity of telephone cables and cable leads in the Brussels district.

Birkenhead.—May 26th. Coal for power stations, for the Mersey Railway Co. Mr. J. Shaw, General Manager and Secretary, Central Station.

Cardiff.—May 28th. Corporation. Pipe-work and feed tank. See "Official Notices" May 8th.

Cleckheaton.—May 23rd. U.D.C. 2,000 yards of concentric cable and 2,000 yards of three-core pilot. See "Official Notices" May 8th.

Croydon.—June 9th. Coal for a year, for the Corporation Tramway Department. Borough Engineer, Town Hall.

Darlington.—June 4th. Corporation. One water-tube boiler and one cooling tower, for the Electricity Department. Specification from the Borough Electrical Engineer, Electricity Works, Haughton Road.

Dartford.—June 15th. U.D.C. One 500-kw. high-pressure steam turbine, generator, condenser, &c. See "Official Notices" to-day.

Dublin.—May 25th. Corporation. A.C. slot meters. See "Official Notices" May 15th.

Grangemouth.—Corporation. Supply of electric lamps, stores, &c. Specifications from Mr. D. A. Donald, Burgh Engineer.

Gravesend.—May 25th. Switchboard platform extension and high-tension room, at the Corporation Electricity Works. Borough Surveyor.

Harrogate.—The Borough Electrical Engineer is preparing a scheme for increased coal storage at the Electricity Works.

Hornsey.—June 3rd. B.C. Twelve months' supply of coal for the electricity department. Forms of tender from the Town Clerk's Office, 99, Southwood Lane, Highgate, N.

H.M. Office of Works.—June 2nd. Three years' supply of lift ropes. See "Official Notices" to-day.

Keighley.—May 25th. Corporation. One 750-kw. converting plant, for A.C., three-phase, 6,600 volts to D.C. 500 volts. See "Official Notices" May 8th.

Leeds.—June 29th. Corporation. Air-cooled transformers. See "Official Notices" to-day.

Liverpool.—June 2nd. Electrical fittings and stores for 12 months, for the directors of the Liverpool Overhead Railway. Forms of tender from the Manager, 31, James Street.

London.—Fulham. May 27th. B.C. 9,000 tons of coal for the electricity works. See "Official Notices" May 8th.

June 4th. Installation, 760 wiring points, 900 lights; telephones, call and fire bells; at Furzedown Training College and Hostels, Tooting, S.W. See "Official Notices" May 15th.

Hammersmith.—May 27th. B.C. Air-cooled static transformers, and earthenware cable ducts. See "Official Notices" May 15th.

Metropolitan Police.—June 3rd. Three years' supply and maintenance of electrical cell calls at Police Stations and Courts, for the Receiver, New Scotland Yard. See "Official Notices" to-day.

St. Pancras.—June 3rd. B.C. Coal for 12 months for the electricity department. Forms of tender from the Electricity Department, 57, Pratt Street, Camden Town, N.W.

Hampstead.—June 11th. B.C. One 1,500-kw. turbo-alternator, barometric jet condenser and pipework, cooling tower and tanks. See "Official Notices" to-day.

Stepney.—June 11th. B.C. Three years' supply meters, demand indicators, time switches and carbons. See "Official Notices" to-day.

Loughrea (Co. Galway).—May 30th. Gas engine and suction plant, dynamo and motor booster, storage battery, switchboard, overhead lines and street lamps, for Loughrea Electric Power and Lighting Co. See "Official Notices" May 15th.

New Zealand.—WELLINGTON.—July 9th. City Council. Electric chassis for a 2,000-lb. parcels delivery van, and an electric car, for the Electric Tramways Department. Specification may be seen at the Board of Trade Commercial Intelligence Department in London.

July 27th.—New Plymouth B.C. (2) Overhead wiring and permanent way (5 route miles). (3) Sub-station equipment (converting plant, battery, booster, switchboard, &c.). (4) Rolling stock (six complete cars) for electric tramways. Specifications from Mr. F. Black, Consulting Engineer, Wellington, or B. of T. Offices, London. Deposit (2) £4 4s.; (3) £2 2s.; (4) £2 2s.—*N. Z. Shipping and Commerce.*

AUCKLAND.—August 6th. Three 750-KW. D.C. mixed-pressure turbo-generators; one 1,500-KW. three-phase turbo-generator, including auxiliary plant and sub-station equipment. See "Official Notices" to-day.

Penrhiwceiber (Glam.).—June 3rd. Twelve months' supply of electrical fittings, stores, &c., for the Penrikyber Navigation Colliery Co., Ltd. Forms of Tenders from the Secretary.

Rochdale.—The T.C. invites tenders for horizontal-type steam-driven boiler-feed pumps. Mr. C. C. Atchison, Borough Electrical Engineer.

Shanghai.—May 28th. H.T. three-phase switchgear for a sub-station, for Municipal Council. See "Official Notices" May 15th.

Spain.—June 8th. The municipal authorities of Fregenal de la Sierra (Province of Badajoz). Concession for the electric lighting of the town during a period of 10 years.

Tenders have just been invited by the municipal authorities of Motilla del Palancar (Province of Cuenca) for the concession for the electric lighting of the town during a period of eight years.

Swindon.—June 3rd. Corporation. Steam coal. See "Official Notices" to-day.

Warrington.—May 26th. Corporation tramways. (1) 100 tons tram rails (Sandberg steel). (2) Special track work. Specifications, &c., from Tramways Manager, Car Sheds, Mersey Street.

Warwick.—June 1st. B.C. Manholes, chambers, sedimentation and storm-water tanks, and other works. See "Official Notices" May 15th.

June 1st. B.C. Electric motors, centrifugal pumps, switchgear, automatic control apparatus, pipes, valves, &c. See "Official Notices" to-day.

CLOSED.

Australia.—QUEENSLAND.—P.M.G.'s Department :—

Telephone material.—Western Electric Co. (Aus.), Ltd.
Conductor cords.—B.I. and Helsby Cables, Ltd.
15 cordless magneto switchboards, 6 lines, £6 each; 40 ditto, 10 lines, £8 10s. each; 20 magneto wall-pattern switchboards, 15 lines, £10 1s. each; 35 ditto, 25 lines, £14 19s. 6d. each; 30 non-multiple magneto switchboards, 100 lines, £40 15s. each.—J. Paton & Co.

Prahran and Malvern Tramways Trust :—

Special work (points and crossings), £3,687.—Edgar Allen & Co., Ltd.
Overhead materials and cables, £3,995.—B.I. and Helsby Cables, Ltd.
Australian Mining Standard.

Bedford.—The Corporation has made a contract with the British Thomson-Houston Co., Ltd., for a year's supply of type R.H. A.C. meters.

Bolton.—The Electricity Committee has accepted the following tenders :—

Rees Roturbo Co., Ltd.—Pressure pumps.
Grimshaw & Peers.—Cast-iron frames.

Chesterfield.—The T.C. has accepted the tender of the Daimler Co. for six additional motor-'buses.

Clacton-on-Sea.—The U.D.C. has accepted the tender of Messrs. Johnson & Phillips, Ltd., for 440 yards of service cable, at £56 10s.

Edinburgh and Kirkcaldy.—Messrs. Chamberlain and Hookham, Ltd., have received the contract from Edinburgh for the supply of D.C. meters for the coming year. They have also received the Kirkcaldy contract.

Government Contracts.—The following tenders have been accepted during the past month by the Government departments named :—

ADMIRALTY.—CONTRACT DEPARTMENT.

Electrical fittings (switches, sockets, plugs, &c.).—B.I. and Helsby Cables, Ltd.; Clarke, Chapman & Co., Ltd.; Edison & Swan, &c., Co., Ltd.; Foster Engineering Co., Ltd.; Hawkers, Ltd.; McGeoch & Co., Ltd.; Player & Mitchell; Sterling Telephone, &c., Co., Ltd.
Incandescent lamps.—Stearn Electric Lamp Co., Ltd.; B.T.H. Co., Ltd.; Crypselco, Ltd.; Edison & Swan, &c., Co., Ltd.; General Electric Co., Ltd.; Rugby Lamp Co., Ltd.; Pope's Electric Lamp Co., Ltd.
Motor generators, control gear and motors.—Veritys, Ltd.

WAR OFFICE.

Telephones, hand and parts.—British L.M. Ericsson Manufacturing Co., Ltd.; Midland Electric Wire Co., Ltd.; Phœnix Telephone and Electric Works Co., Ltd.; Siemens Bros. & Co., Ltd.
Installation of electric light, Herbert Hospital, Woolwich.—Pinching and Walton.
Installation of electric light, Piershill Barracks, Edinburgh.—Grindlay, Ross & Co.

CROWN AGENTS FOR THE COLONIES.

Staff instruments.—Railway Signal Co., Ltd.
Tablet instruments.—Tyer & Co., Ltd.
Insulators.—Siemens Bros. & Co., Ltd.
Signals.—Railway Signal Co., Ltd.
Signalling materials.—Tyer & Co., Ltd.
Struts, &c.—Siemens Bros. & Co., Ltd.
Telegraph material.—Siemens Bros. & Co., Ltd.
Telegraph line material.—Bullers, Ltd.

INDIA OFFICE.—STORE DEPARTMENT.

Cells.—Siemens Bros. & Co., Ltd.
Insulators.—Taylor, Tunnicliffe & Co.
Motor alternator.—Lancashire Dynamo, &c., Co.

POST OFFICE.

Electric conductor rails, experimental railway, Woolwich, S.E.—Dick, Kerr & Co., Ltd.
Electric lighting.—N.W.D.O., London.—G. E. Taylor & Co.
Electrical equipment, Manchester, H.P.O.—Spagnoletti, Ltd.
Electric motor wagons, experimental railway, Woolwich.—Dick, Kerr and Co., Ltd.
Laying lines of ducts (Southwark and Deptford), D. R. Paterson, Ltd.; (Greenwich), F. G. Brummell; (Lisle Street, Wardour Street), Grieg and Matthews; (Torquay), J. A. Ewart, Ltd.
Laying lines of ducts and U-shaped earthenware troughing, Runcorn.—W. H. Worthington, Ltd.
Storage battery, Manchester H.P.O.—Premier Accumulator Co., Ltd.
Telephone exchange equipment, Darwen. — Peel-Conner Telephone Works, Ltd.
Telephone exchange equipment, extension, Derby.—Western Electric Co., Ltd.
Wireless stations (electrical equipment), Stonehaven and Cullercoats.—Marconi's Wireless Telegraph Co., Ltd.
Telephonic apparatus.—B.I. and Helsby Cables, Ltd.; North British Rubber Co., Ltd.; Western Electric Co., Ltd.
Testing apparatus.—General Electric Co., Ltd.
Extension arms.—Bullers, Ltd.
Battery boxes.—British L. M. Ericsson Manufacturing Co., Ltd.
Submarine cable.—W. T. Henley's Co., Ltd.; Siemens Bros. & Co., Ltd.
Telephonic cable.—B. I. and Helsby Cables, Ltd.; Connolly Bros., Ltd.; W. T. Henley's Co., Ltd.; Siemens Bros. & Co., Ltd.
Porous cells.—Siemens Bros. & Co., Ltd.
Compound for ducts.—Dussek Bros. & Co., Ltd.
Stoneware ducts; insulators.—Doulton & Co., Ltd.
Telegraph paper.—Waterlow & Sons, Ltd.
Copper wire.—B. I. and Helsby Cables, Ltd.
Flame-proof wire.—C. MacIntosh & Co., Ltd.

H.M. OFFICE OF WORKS, &c.

Lift, Board of Agriculture and Fisheries.—Medway's Safety Lift Co.; R. Waygood & Co., Ltd.
Electric bellhanger's work.—Napier-Kimber, Ltd.

Ilford.—The U.D.C. has accepted the tender of Messrs. Frederick Smith & Co., for the supply of two miles of tramway trolley wire, at 8⅛d. per lb. The tender of Messrs. G. & J. W. Fox has also been accepted, at £1,308, for the erection of an electricity sub-station and showroom, &c., at Goodmayes.

Leeds.—The Tramways and Electrical Committee has accepted the following tenders for 12 months' supplies :—

Electrical Sundries.—General Electric Co.; Barr Bros.; British Thomson-Houston Co.; Tramway Supplies, Ltd.; Ruberoid Co.; British Westinghouse Manufacturing Co.; A. Thompson; L. Andrew & Co.; Carl Quitman; Spicer Bros., Ltd.
Oils.—R. Humble & Sons; T. H. Newsome & Co.; T. Batt & Co.; Tunstall & Co., Ltd.; Vacuum Oil Co.; J. W. Miller & Son; Theo. Phillips, Son & Co.; Leeds Oil and Grease Co.; Valvaline Oil Co.
Paints and varnishes.—G. Exley & Son; Hirst, Brook & Hirst, Ltd. Yorkshire Varnish Co.; Ross & Co.; W. Moss & Sons; R. Kearsley and Sons; Docker Bros., Ltd.; Tearne & Sons; W. Wright and Sons.
Tires.—J. Brown & Sons.
Axles.—Taylor Bros. and Co.
Points.—Hadfield's Steel Foundry, Ltd.
Fish bolts.—Bayliss, Jones & Bayliss, Ltd.
Fish plates.—Bolckow, Vaughan & Co.
Reconstruction of track.—David Speight & Son.

The Committee has also accepted the tender of Messrs. Dick, Kerr & Co., Ltd., for 100 controllers, at £25 each; that of Messrs. Elliott Bros., for one 10,000-ampere ammeter, at £32; of Messrs. Dick, Kerr & Co., Ltd., for 10 electrical equipments for cars, at £234 10s. each; and of the British Thomson-Houston Co., for 36 arc lamps, at £6 10s. each.

London.—SHOREDITCH.—The B.C. Electricity Committee recommends the acceptance of the following quotation of Messrs. W. Griffiths & Co., Ltd., for laying ducts for the trunk main from the Coronet Street electricity station to the Shoreditch and Stepney borough boundary :—

For laying two three-way Sykes ducts under footway, 4s. 9d. per yd. run; granite sett or wood paved carriageway, 16s. 6d. per yd. run; asphalte carriageway, 26s. per yd. run; laying ducts in tunnel, 15s. or 20s. per yd. run, according to depth; building manholes, 1s. 9d. per ft. cb. 14-in. brickwork; 1s. 5d. per ft. cb. for 9-in. brickwork, and 1s. ft. cb. for 4½-in. brickwork; supplying and spreading Portland cement concrete, 18s. 6d. per yd. cb.

The Committee reports the acceptance of the tender of Messrs. J. W. Simpson & Co., Ltd., for £240, for boring out valve chambers and supplying new valves for No. 1 Wallsend engine at Whiston Street works.

LAMBETH.—The Guardians have accepted the tender of the South Metropolitan Electric Supply Co., Ltd., of Loughborough Junction, for two electric motors in connection with the laundry plant at the Brook Street infirmary for £230.

WOOLWICH.—The following tenders have been accepted by the Borough Council in connection with the Grove Lane generating station extensions :—

Drew-Bear, Perks & Co., Ltd.—Steelwork for windscreen, £109.
Babcock & Wilcox, Ltd.—Steam piping, £33.
Frodingham Iron and Steel Works.—16 tons of rolled steel joists, £6 16s. per ton.
R. H. Skelton & Co.—Coal bunkers in the new boiler house, £1,044.
Ferranti, Ltd.—Two sets of choking resistances for two 250-KW. motor-generators, £50.
Wm. Cory & Son, Ltd.—Steam coal, 3,000 tons, 18s. per ton; 5,000 tons, 11s. 7d. per ton.

G.P.O.—The Controller of Stores of the G.P.O. has accepted the tender of the Edison & Swan United Co. for "Royal Ediswan" drawn-wire lamps.

MARYLEBONE.—The tender of Messrs. J. Garrett & Son has been provisionally accepted by the B.C., at £1,160, for excavating for and constructing the underground pump chamber at the generating station.

WANDSWORTH.—The tender of Messrs. E. W. Smithet & Co. is recommended for acceptance, at £85, for repairing the electric lifts at the St. John's Hill Infirmary. Other tenderers were :—

Hammond Bros. & Champness	£81	Penrose & Co.	£113
Medway's Safety Lift Co. ..	103	The Easton Lift Co.	123
Waygood & Co.	103		

METROPOLITAN ASYLUMS BOARD.—The following tenders have been received for the installation of electric light in Blocks 4 and 6 at the Grove Hospital :—

Alpha Mfg. Co.	(accepted) £344	Arthur Newman, Ltd.	£460
Lund Bros. & Co.	359	J. and F. May	391
Ellis & Ward, Ltd.	360	A.E.G. Electric Co., Ltd. ..	441
G. Weston & Sons	363	Electric Installations, Ltd. ..	447
H. J. Godfrey	386	Toy & Winslow	470
Sherratt Bros.	393	F. M. Prockter & Co , Ltd. ..	497
C. H. Cathcart & Co.	445		

The following tenders have been received for re-wiring the fire alarm and telephone systems, &c., at the Southern Hospital :—

J. and F. May	(accepted) £709	Lund Bros. & Co...	£720
Arthur Newman, Ltd.	732	Electric Installations, Ltd. ..	790
A. V. Gifkins & Co.	969	G. Weston & Sons, Ltd. ..	1,020
C. H. Cathcart & Co.	1,071	Sherratt Bros.	1,300

The Board has accepted a revised offer of the Synchronome Co., Ltd., to supply and maintain a system of 59 electrically-controlled clocks at the Eastern Hospital, at an annual rental of £28 0s. 6d., on a seven years' contract.

L.C.C.—The following tenders have been received by the London Education Committee for installing electric light in the schools named :—

WILSON STREET, ISLINGTON.

Lund Bros. & Co...	(accepted) £419	R. H. & J. Pearson	£488
Alpha Manufacturing Co. ..	429	C. H. Cathcart & Co.	510
Arthur Newman, Ltd.	429	H. J. Cash & Co., Ltd.	519
G. Weston & Sons, Ltd.	445	Defries & Goldman	825
J. & F. May	475		

BLOOMFIELD ROAD, WOOLWICH.

Alpha Manufacturing Co.	(accepted) £141	G. Weston & Sons, Ltd.	£175
W. Dickinson & Co.	163	C. H. Cathcart & Co.	184
Lund Bros. & Co.	170	Arthur Newman, Ltd.	191
		W. E. King	275

Luton.—The Town Council is recommended by the Electricity Committee to accept the tender of Messrs. Babcock and Wilcox, Ltd., at £298, for steam piping; also that of Messrs. Oates, at £277, for cast-iron piping.

Margate.—The T.C. has accepted the tender of Mr. A. H. Markey, Margate, for an electrical clock, with illuminated dials, for the turret at the Pavilion at Westcliff, at £30 3s. 6d. Messrs. Gent & Co., Ltd., tendered at £47 16s. Mr. Markey is also to provide an automatic time switch for putting on and off the electric light, at £10 5s.

Merthyr Tydfil.—For installing the E.L. at the Training School, the B. of G. received the following tenders :—

Aberdare Electrical Co., Ltd.	(accepted) £343
South Wales Accessories Co.	303
J. A. Baster	321
R. Alger & Sons	369
A.E.G. Electric Co.	414
Saville & Walton	425
Ellis & Ward	436
J. W. Law	500
Troup, Curtis & Co.	538

The accepted tender was recommended by the Building Committee, but there was some objection made regarding the rejection of the lowest tender, on the ground that there might be a surcharge by the L.G.B. auditor.

Newcastle and Sunderland.—The General Electric Co., Ltd, have obtained an order for 40 "Angold" magazine flame arc lamps for the Newcastle Corporation tramways; and a further repeat order for 23 "Angold" magazine flame arc lamps from the Sunderland Corporation.

New Zealand.—Public Service Tender Board :—

4,500 twin conductor cords, £358.—Lawrence and Hanson Electrical Co.
5 miles 704 yards composite telegraph and telephone cable, £3,673; 3 miles air-space paper-insulated lead-covered telephone cable, £510.—P. R. Baillie & Co.—*Australian Mining Standard.*

Portsmouth.—The T.C. has accepted the tender of Messrs. C. A. Parsons & Co. for a 2,000-KW. turbo-alternator and condensing plant, at £7,179. Several lower tenders were for foreign makes, but Alderman F. G. Foster said that the combination plant suggested was considered to be the best for the requirements of the station.

Ramsbottom.—The U.D.C. has accepted the tender of the R.E.T. Construction Co., Ltd., for two new cars, complete with wheel guards and side guards, and wheels fitted to take 40-in. diameter tires. The company will also provide new wheels and springs and new bodies for the old cars, at £60 per car.

South Africa.—CAPE TOWN.—The contract for the alterations to the electric lighting, supply of dimmers, &c., at the Opera House has been placed with Messrs. E. A. Shaw & Co

Sunderland.—The T.C. has accepted the following tenders on behalf of the Electricity Committee :—

Sloan Electrical Co.—Carbons.
General Electric Co., Ltd.—Flame arc lamps.
Phœnix Dynamo Co.—Re-winding alternator.
W. Walker.—Dearborn water treatment composition.

Messrs. J. H. Tucker & Co., of Birmingham, have received from the Corporation tramway department a contract for the supply of its lampholder requirements during the next 12 months.

Taunton.—The T.C. has accepted the tender of Messrs. Belliss & Morcom for an engine governor, at £45, plus fitter's time and expenses; and that of Henley's Telegraph Works Co., Ltd., for a year's supply of cables.

Tynemouth.—The tenders of Mr. R. R. Todd for 300 yards of '4-in. cable and 300 yards of '15-in. cable, and Henley's Telegraph Works Co., Ltd., for 77 yards of armoured cable, are recommended for acceptance by the Council.

West Bromwich.—The T.C. has accepted the tender of Messrs. Bruce Peebles & Co., Ltd., for a three-wire balancer.

FORTHCOMING EVENTS.

Junior Institution of Engineers.—Friday, May 22nd. At 8 p.m. At 39, Victoria Street. Discussion on "The Neglected Steam-Car," led by Mr. R. S. Box.

Physical Society.—Friday, May 22nd. At 5 p.m. At Imperial College of Science, South Kensington. Ordinary meeting. Papers "On a Null Method of Testing Vibration Galvanometers," by Mr. S. Butterworth, "Experiments with an Incandescent Lamp," by Messrs. C. W. S. Crawley and S. W. J. Smith, and other subjects.

Association of Engineers-in-Charge.—Saturday, May 23rd. Visit to Leiston Works, Leiston, Suffolk.

Institution of Electrical Engineers (Newcastle Local Section).—Tuesday, May 26th. At 7.30 p.m. At Armstrong College. Annual General Meeting.

Concrete Institute.—Thursday, May 28th. At 8 p.m. At Connaught Rooms, Great Queen Street, W.C. Annual Dinner.

Royal Institution of Great Britain.—Thursday, May 28th. At 3 p.m. At Albemarle Street, W. Lecture (III) on "Identity of Laws: In General and Biological Chemistry," by Prof. Svante Arrhenius, Hon. F.R.S.

Liverpool and District Electrical Masters' Association.—Friday, May 29th. At 7.45 p.m. At St George's Restaurant, Redcross Street, Liverpool. First smoking concert.

THE ELECTRICAL ENGINEERS
(LONDON DIVISION).

Commanding Officer—LIEUT.-COL. H. M. LEAF.

The following orders have been issued :—

Friday, May 22nd.—"D" Company. Infantry drill, 7 to 8 p.m. Technical instruction, 8 to 10 p.m.

Saturday, May 23rd.—Headquarters will be opened from 10 a.m. till 12 noon.

Monday, May 25th.—"A" Company. Infantry drill, 7 to 8 p.m. Technical instruction, 8 to 10 p.m. Miniature range instruction, 8 to 9.30 p.m.

Tuesday, May 26th.—"B" Company. Infantry drill, 7 to 8 p.m. Technical instruction, 8.30 to 10 p.m. Miniature range instruction, 8 to 10 p.m.

Wednesday, May 27th.—All Companies. Annual course of musketry at Purfleet. Rating examinations, 7 to 9.30 p.m.

Thursday, May 28th.—"C" Company. Infantry drill, 7 to 8.30 p.m. Technical instruction, 8.30 to 10 p.m. Miniature range instruction, 8 30 to 10 p.m.

Friday, May 29th.—"D" Company. Infantry drill. 7 to 9 p.m. Technical instruction, 9 to 10 p.m. Miniature range instruction, 7 to 9 p.m.

Saturday, May 30th.—Headquarters will be opened from 10 a.m. till 12 noon for regimental business only.

(Signed) F. R. HOLT-WHITE, Capt. R.E., Adjutant.
For Officer commanding L.E.E.

A Visit to Germany.—The 40 L.B. and S.C. railwaymen, during their visit to the A.E.G. works at Berlin, were entertained to a "Red, White and Blue" luncheon. According to the *Daily News* Berlin correspondent, Director Hamspohn, in his greeting, outlined his "pet idea," that "progress in education and industry should be unified and internationalised to the common benefit of all countries, as science already is to a large extent. Competition would thus take milder forms, and make for international peace instead of international discord." This, says the writer, is "one of the working principles of the A.E.G.," and in reality "the basis of this visit"!

Our Trade with Canada.—On Tuesday afternoon at the London Chamber of Commerce, Mr. C. Hamilton Wickes, H.M. Trade Commissioner for Canada and Newfoundland, delivered an interesting address on "British Trade with Canada." We shall refer to the matter in our next issue.

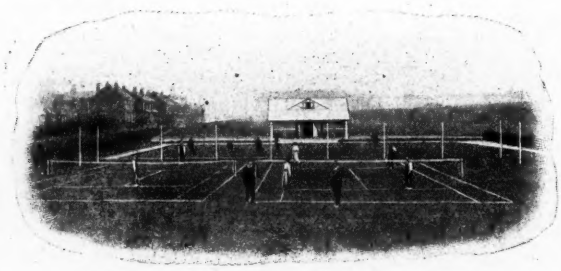
Appointments Vacant.—Assistant mains superintendent (£2), for Aberdeen Corporation; assistant master in electrical engineering at the Polytechnic, Regent Street, W., for day and evening work (£180); assistant electrical engineer, for Government of Nigeria, age 25 to 40 (£300); assistant electrical and mains engineer (£104), for Londonderry Corporation. Particulars are given in our advertisement pages.

NOTES.

Our Statistical Tables.—As most of our readers are aware, for many years we published annual tables of statistics relating to electricity works, tramways, &c., in the form of single sheets; but as time passed, and the number of items increased, it repeatedly became necessary to shorten the data and to restrict the space allotted to each item, to prevent the sheets from becoming too unwieldy to be useful.

There are, however, many objections to a sheet, which must necessarily be fixed on the wall to be accessible, and we have been asked to throw the matter into the form of a booklet for desk use. This we have now done, and the book was issued last week at the price of 1s., post free 1s. 1d. Its dimensions are 4¾ in. high × 9¾ in. wide, and the contents are chosen with a view to including all information that is generally useful and necessary regarding the undertakings concerned (electricity works, electric tramways, railways and power companies), without overcrowding the book with superfluous particulars; it is handy for reference, and needs neither a stepladder nor a microscope as aids to its use. We trust our readers will find it serviceable to them in their respective vocations.

The E.C.C. Works Institute.—The Institute connected with the works of the Electric Construction Co., Ltd., at Wolverhampton, can now boast a fine equipment for indoor and outdoor recreation, this state of affairs having been brought about within the last 12 months, mainly owing to the generous co-operation of the board of directors. Indoors the members of the Institute have a new and spacious main hall containing two billiard tables. Annexed are a comfortable reading room and a lending library. Outside there is provision for the ancient game of bowls and its modern rival, lawn tennis. Crown-green bowling is favoured in Staffordshire, and accordingly the club, backed by the board of directors, has provided itself with a large crowned green, scientifically laid by a leading expert from the north. This green was formally declared open last summer by the chairman of directors, Mr. P. E. Beachcroft, but in view of its great cost and extreme youth, the club decided not to bowl upon it until the following season. An examination of the green at the present



THE E.C.C. TENNIS AND BOWLING GROUND.

time shows how fully this heroic abstinence has been rewarded. Meantime, the question was asked: "If an outdoor sports ground, why no pavilion?" Through the kind offices of Mr. William Bulloch (manager, a director of the company and president of the Institute), the board was again approached, and as a result a substantial brick pavilion, with large main hall, cooking range, buffet, stuccoed walls, wooden verandah, and asbestos-tiled roof, now overlooks the lawns. On Saturday, May 9th, Mr. Beachcroft visited the works with the object of opening this pavilion and the new tennis lawns. Lunch was partaken of at the works, and at 2.15 o'clock the proceedings began with wrestling and boxing matches, followed by a competition open to the members of the E.C.C. fire brigade. The gathering then moved to the front of the pavilion, where Mr. Bulloch, after congratulating the club upon its acquisition, and reminding the members of the debt of gratitude owing to the chairman, asked Mr. Beachcroft to open the pavilion, and begged his acceptance of a pair of gold-handled scissors, wherewith to cut down the key which was suspended from the verandah arch. Mr. Beachcroft responded with a speech which appealed strongly to the sporting proclivities of the members, and at the same time served to accentuate the feeling of fellowship which exists between the board of directors and its employés. The pavilion was then declared open. Mr. W. M. Furniss proposed a hearty vote of thanks to Mr. Beachcroft for going down specially for the occasion, and this was seconded by Mr. James May, the oldest member of the Institute, and carried with acclamation. The arrangements were in the hands of the hon. sec., Mr. Frank Guinness, and the afternoon was voted a thoroughly enjoyable one, the only cause for regret being the unavoidable absence of Mr. James Gray (managing director), to whom the Institute—the bowling section in particular—owes so much of its success.

A Manchester Committee.—Mr. J. Johnston has given notice of his intention to move the following resolution at a meeting of the Manchester City Council:—That a Special Committee be appointed to inquire and report on the alleged attempts of a member of this Council to exercise undue influence on the officials of the Corporation with the object of securing orders for a firm in which he was personally interested, and to make such recommendations as will in future protect the whole of the officials of the Corporation in the proper execution of their duties.

Electricity Supply Rifle League.—The following are the match results for April last:—Brimsdown (Mursell, 97), 550, Brompton (Willis, 99), 569; Brimsdown (Mursell, 97), 550, Shoreditch (Foster, 98), 574; Brompton (Beale, Furneaux, Mugford, 95), 554, Central (Cope, Rhodes, 97), 574; Brompton (Palmer, 97), 566, Hackney (Hilling, 97), 565; Central (Cope, Harvey, 100), 575, Poplar (Randall, 89), 497; City Co. (Harlow, 96), 546, Hackney (Hilling, 98), 530; City Co. (Harlow, 98), 555, Shoreditch (Harrison, Herbert, 98), 573; Ilford (R. Tufnell, 95), 553, St. James's (Beaton, Young, 96), 569; Ilford (R. Tufnell, 96), 546, Westminster (Winchcombe, 97), 547; Poplar (Randall, 94), 538, St. James's (Beaton, 97), 557; Shoreditch (Thomas, 97), 572, Westminster (Winchcombe, 95), 554. The following are the positions to date:—

	Matches.				Scores.		Average
	Shot.	Won.	Lost.	Pnts.	For.	Agnst.	per match.
Shoreditch ...	4	4	0	8	2,293	2,182	573·25
Central ...	4	4	0	8	2,290	2,166	572·5
Brompton ...	5	4	1	8	2,832	2,779	566·4
St. James's ...	4	2	2	4	2,228	2,236	557·0
Ilford ...	4	1	3	2	2,222	2,197	555·5
Westminster	3	1	2	2	1,659	1,697	553·0
City Co. ...	2	1	1	2	1,101	1,103	550·5
Hackney ...	3	1	2	2	1,621	1,645	540·3
Brimsdown ...	3	0	3	0	1,633	1,679	544·3
Poplar ...	4	0	4	0	2,079	2,274	519·75

Centurions during the month:—Messrs. Cope and Harvey (Central).

A Scottish Granary Installation.—The new Meadowside Granary of the Clyde Navigation Trustees, which was recently opened at Partick, has a capacity of over 30,000 tons of grain, including 150 silo bins to hold 20,000 tons, and floor storage on eleven floors for 11,000 tons. The building is 312 ft. long, and the conveyor gallery running along the top is 130 ft. above the ground. Two travelling ship elevators, each of 250 tons an hour capacity, are installed on the quay for unloading vessels, these feeding the band conveyor system and main elevators. All the machinery is operated by electric motors, of which there are three of 10 H.P. to drive small bands, four of 15 H.P. to drive small bands, four of 25 H.P. to drive long bands, a 25-H.P. motor to drive elevator C. 3, two of 40 H.P. for the first lift in the ship's elevator, two of 30 H.P. for the second lift in the ship's elevator, two of 30 H.P. to drive long bands, also a 15-H.P. motor to drive turnover bands. Two 65-H.P. motors drive the main elevators.

In addition to the above there are eight 30-H.P. motors for the tunnel bands, two 10-H.P. motors for hoisting and lowering the elevators out of and into the vessel's hold, four 5-H.P. motors for driving the ship elevators along the quayside, and a motor of 8 H.P. for the electric passenger hoist.

An interesting part of the installation is the Igranic electric controlling apparatus. The grain taken up by the ship elevators is passed through automatic weighing machines and dropped on to the tunnel bands for conveyance through long tunnels by means of travelling bands operated by eight different electric motors. These tunnel bands convey the grain to the main elevator, which lifts it to the top for distribution throughout the building as required by means of shutes. Special precautions have been taken to guard against the stopping of any part of the belt in the tunnels, as these belts run from 9 to 10 miles an hour, and in a very few minutes there would be an accumulation of several tons of grain, which would have to be dug out by manual labour in order to allow the belts to re-start. Should any one tunnel motor stop, all those preceding it are automatically stopped by means of the special automatic controllers provided; further, when it is desired to start any one of these motors, it is only necessary to start one by moving a small master switch, and all the succeeding motors are started automatically.

The whole of the control gear is entirely foolproof and self-protecting, and the possibility of breakdown is therefore rendered exceedingly remote. The general idea has been to provide control gear which can be operated by few unskilled men, and in view of the loss which the breakdown would entail, the whole of the apparatus supplied has been of the highest class.

The passenger hoist is, we understand, serving a larger number of floors than any other hoist in the country; the controller for this has also been designed so as to allow of easy starting and stopping in correct register with the floors, even when operated by a strange operator.

China.—The *Standard* states that a memorial has been addressed by the Association of Chambers of Commerce to Mr. Lloyd George and Sir Edward Grey asking the Government to make a grant of not less than £300,000 out of the annual payments by China of the Boxer indemnity, towards the establishment of a British university at Hankau or such other influential centre in China as may be considered most suitable.

The Board of Trade (on the recommendation of the Advisory Committee on Commercial Intelligence) has appointed Mr. T. M. Ainscough a Special Commissioner to inquire into the conditions and prospects of British trade in China. Mr. Ainscough is to leave England before the end of May, and until then letters can be addressed to him at the Commercial Intelligence Branch of the Board of Trade, London, E.C.

Another Flying Train.—An inventor in South Africa—a Mr. Esson—is reported to claim that he has devised a car which can travel at 500 miles an hour. The idea is to use a monorail and an overhead trolley wire; when the car, driven by an air propeller, attains sufficient speed, it will leave the rail and fly. The idea (but not the car) appears to be in the air.

The Liverpool and District Electrical Masters' Association.—We are informed that, largely owing to the demands of the Electrical Trades Union, the above Association is now an accomplished fact, and in response to a circular letter issued on March 3rd over 100 representatives of electrical firms attended a meeting held at the Common Hall, Hackins Hey, Liverpool, on March 17th. The foundation stone was then laid. The success in forming the Association has been remarkable. The membership at the moment consists of upwards of 70 well-known electrical firms, comprising most of the employers in Liverpool and district, and we understand that new members are frequently being enrolled. The primary object of the Association is to deal with labour questions, and judging from the latest demands of the local branch of the Electrical Trades Union, there is no doubt that such a body is necessary if the masters are to protect their own interests, and that it is appreciated by the electrical masters is evident by the large attendances at the various meetings that have been held. Liverpool workmen have been advanced from 9d. to 9½d. in the last six months, whereas Manchester has only just signed an agreement with the Electrical Trades Union to hold good for two years, in which the rate of wages is to be 9½d. per hour for that period. Although the wages question is perhaps the chief item, several of the other demands are regarded as equally extravagant.

The members of the Masters' Association are unanimous in their resolve not to grant these demands, and at a Conference with the delegates of the E.T.U. held last week, the Union officials were informed that none of their demands could be considered. The next move will come from the Union, and it will be interesting to note what form this takes on June 1st. The masters are fully alive to the seriousness of the situation, and in the event of a strike, are stated to be fully organised to carry out with non-Union labour the most urgent work on hand. They also consider that it is quite time the great, and in their opinion, unnecessary, unrest amongst workmen lately experienced should be settled, as contracts cannot be made in advance with any confidence that the work will be continuous.

The new Association commenced its career at the first annual general meeting on April 29th, at St. George's Restaurant, Redcross Street, when the rules were finally discussed and the method of procedure for the next 12 months was arranged. The committee elected were as follows :—

Chairman.—Mr. A. B. Gregson (Northern Electric and Ventilating Co.).

Vice-Chairman.—Mr. H. T. Boothroyd (H. T. Boothroyd & Co.).

Hon. Secretary.—Mr. E. G. Pulford (Pulford Bros., Ltd.).

Hon. Treasurer.—Mr. S. MacLeish (John Hunter & Co.).

Committee.—Mr. F. W. Smith (Herd & Smith); Mr. T. W. Robson (T. W. Robson & Sons); Mr. A. E. Chesters (A. E. Chesters); Mr. J. O. Rhodes (Electric Light and Engineering Co.); Mr. J. Scott (J. Scott, Ltd.); Mr J. Boult (John Boult & Co.); Mr. H. L. Downes (Downes & Davies); Mr. F. B. Hellon (Hellon and Co.).

In addition to the above Executive Committee, an Entertainment Committee was elected to look after the interests of the members on the social side, as follows :—Mr. J. G. Wilson (J. G. Wilson and Co.); Mr. Bennett (Simplex Conduits, Ltd.); Mr. Wood (Downes and Davies); Mr. Davies (Downes & Davies); Mr. Hellon (Hellon and Co.); Mr. Myer (F. Wilkins & Bro.); Mr. Hazel (Dargue, Griffiths & Co.); Mr. Crawford (General Electric Co.).

The first smoking concert will be held on Friday, May 29th, at 7.45 p.m., at St. George's Restaurant, and all intending members are cordially invited to be present.

Strikes and Contract Prices.—Tradesmen who do contract work for municipal and other authorities will be interested in the following resolution, which has been passed by the Harrogate Chamber of Trades, as it is a step in the direction of protecting contractors from sustaining any disability through industrial re-arrangements which may be made during the progress of contracts: — "This Chamber, in full meeting assembled, respectfully petitions the Corporation to include the fair contracts clause in all municipal contracts, *i.e.*, the contractor to pay standard rate of wages, and any increased cost so thrown upon the contractor due to rise in wages or reduction in hours of work, shall be an additional allowance to him on the contract price."

Penalising the Tramway.—From answers given in the House of Commons on Monday by Mr. John Burns, it seems that the Board of Trade has power to inquire into tramway accidents, but it has no power to inquire into motor-omnibus accidents, otherwise than by criminal proceedings.

Two New Committees.—The Treasury has appointed a Committee to consider what steps can be taken to regularise the total demand for labour from year to year and in different seasons, by adjusting the distribution of public work for Government departments and local authorities with reference to the state of employment in particular trades. Mr. Percy Alden, M.P., is Chairman of the Committee, and among the members are :—Mr. G. N. Barnes, M.P., Mr. H. E. Stilgoe (city engineer of Birmingham), and Mr. Cyril Jackson, of the L.C.C.

The B. of T. has appointed a Committee to report upon the working of the Railway Employment (Prevention of Accidents) Act of 1900. Sir W. Collins is chairman, and the members include Sir Alfred Ewing, K.C.B., and Mr. G. N. Barnes, M.P.

Institution and Lecture Notes. — Association of Teachers in Technical Institutions.—The Association will hold its eighth annual Conference at Liverpool during Whitsuntide, May 30th to June 3rd, at the Central Municipal Technical School. The open meetings begin on Monday, June 1st, when the President, Mr. P. Abbott, will deliver his Presidential address. During the Conference papers will be read by Mr. W. Hewitt, Director of Technical Education for Liverpool, Prof. Haldane Gee, Mr. W. E. Harrison, Mr. Laurence Small, Mr. W. R. Bower and others. The annual dinner will be held at the Exchange Station Hotel, on the evening of June 1st. Various visits and social items have been arranged by the Conference Committee, and an exhibition of books and scientific apparatus will be held throughout the Conference at the Technical School. The hon. sec. is Mr. J. P. Yorke, 55, Filey Avenue, Upper Clapton, N.

Birmingham Wireless Association.—On May 6th, Mr. W. F. B. Bartram read a paper on the overhauling of aerials, and dealt fully with the staying of aerial masts. He strongly advocated the use of bamboos for lengthening existing masts, and gave a rough description of a very high mast made in lattice form which cost the owner only about 15s. for material. The next meeting will be on Wednesday, May 27th, at 7.30 p.m.

Institution of Electrical Engineers.—The I.E.E. conversazione will be held at the Natural History Museum, South Kensington, on June 25th.

The result of the ballot for the election of ordinary Members of Council has been announced as follows : Mr. J. Christie, Prof. B. Hopkinson,* Messrs. G. W. Partridge,* W. H. Patchell,* R. J. Wallis-Jones and W. B. Woodhouse.* (* Nominated by the Council.) It will be seen that two of the external nominees, Messrs. J. Christie and R. J. Wallis-Jones, have been elected.

The report of the Committee of the Scottish Local Section, submitted at the annual general meeting, states that the membership numbers 391, or one more than last year. The full list of office-bearers for 1914-15, partly given in our last issue, is as follows :—Chairman, Mr. James Lowson ; Vice-Chairman, Mr. David A. Starr ; Past Chairmen, Messrs. Frank A. Newington, Wm. M'Whirter and J. A. Robertson ; Chairman of Students' Section, Mr. Archibald Page ; Ordinary Members of Committee, Messrs. M. B. Field, J. H. Bunting, J. S. Nicholson, J. K. Stothert, J. F. Nielson, E. T. Goslin, George Stevenson, Wilfrid L. Spence, James E. Sayers, A. S. Hampton, and Prof. J. D. Cormack ; Hon. Secretary and Treasurer, Mr. Joseph Taylor ; Assistant Hon. Secretary, Mr. Wm. F. Mitchell. The Hon. Secretary of the Students' Section is Mr. John W. Mowat.

The annual summer outing has been arranged for Tuesday, June 9th. Members and their friends will take steamer from Wemyss Bay *via* Kyles of Bute to Arran, returning *via* Garroch Head, and luncheon and tea will be served on the steamer.

The annual meeting of the Yorkshire Local Section was held on Wednesday. The following officers were elected :—Chairman, Mr. T. Roles ; Vice-Chairmen, Mr. H. H. Wright and Dr. R. Pohl ; Committee, Messrs. J. H. Schnauber, H. Bell, and W. E. Burnand ; Hon. Sec., Mr. J. D. Bailie. Dr. Pohl gave an address on "The Design of Turbo-alternators from the Users' Point of View," and a discussion followed.

Electrical Manufacturers at Golf.—By the courtesy of the captain and secretary of the West Herts Golf Club, a competition was held at Cassiobury Park, on Saturday, May 16th, between the following electrical manufacturing companies :—The British Thomson-Houston, British Westinghouse, Siemens, and Dick, Kerr. Two rounds were played. In the morning the B.T.H. played against Dick, Kerr, and the Westinghouse against Siemens, while in the afternoon Siemens played Dick, Kerr, and the B.T.H. played Westinghouse. The competition was decided by match play on handicap, and the following were the results, the figures in brackets denoting handicap :—

B.T.H.		Dick, Kerr.	
W. C. Lusk (18), 1 up	1	C. Hardie (18)	0
C. C. Levis (8)	0	D. Kerr (9), 3 & 1	1
J. C. Murray (14)	0	C. Witts (12), 7 & 6	1
F. Hall (20)	0	S. McKay (18) 2 & 1	1
Matches won	1	Matches won	3
Westinghouse.		**Siemens.**	
C. S. Colton (12), 2 & 1	1	E. G. Fleming (12)	0
T. G. Wilson (12)	0	J. Kirkwood (7), 4 & 3	1
A. du Pasquier (20), 8 & 6	1	P. S. Pitt (18)	0
F. M. Rojers (24)	0	G. P. Cooper (18), 6 & 5	1
Matches won	2	Matches won	2
Siemens.		**Dick, Kerr.**	
J. Kirkwood (7)	0	D. Kerr (9), 1 up	1
E. G. Fleming (12), 4 & 3	1	C. Witts (12)	0
P. S. Pitt (18)	0	S. McKay (18), 3 & 2	1
G. P. Cooper (18), halved	½	C. Hardie (18), halved	½
Matches won	1½	Matches won	2½
Westinghouse.		**B.T.H.**	
C. S. Colton (12)	0	W. C. Lusk (18), 4 & 3	1
T. G. Wilson (12), 8 & 6	1	J. C. Murray (14)	0
A. du Pasquier (20)	0	C. C. Levis (8), 3 & 1	1
F. M. Rojers (24), 5 & 4	1	F. Hall (20)	0
Matches won	2	Matches won	2

The final result, therefore, was as follows :—

1st. Dick, Kerr, with 5½ matches.
2nd. Westinghouse, with 4 matches.
3rd. Siemens, with 3½ matches.
4th. B.T.H., with 3 matches.

The weather was perfect, and the course in excellent condition, and the day was thoroughly enjoyed by everybody. We do not hear of any record score being made, but it was unanimously decided that Mr. Lusk's handicap be reduced from 18 to 10.

Rubber.—A cable received by the Malay States Information Agency from Singapore states that the April exports of plantation rubber amounted to 1,548 tons, compared with 1,285 tons in March and 762 in April, 1913. The total exports for the first four months of the current year were 5,717 tons, against 3.187 tons last year. The following table gives the details for the three years:—

	1912.	1913.	1914.
January... ...	253	784	1,181 tons
February ...	274	743	1,703 ,,
March	427	898	1,285 ,,
April	387	762	1,548 ,,
Total ...	1,341	3,187	5,717

These figures include transhipments of rubber from various places in the neighbourhood of the Straits Settlements, such as Borneo, Java, Sumatra and the non-Federated Malay States, as well as rubber actually exported from the Colony, but they do not include rubber exports from the Federated Malay States.

At the auctions commenced early this week there was a record quantity listed for sale, the total aggregating 1,500 tons. The prices ruling at the opening showed a small reduction compared with those obtaining in the private market, and a moderate fall compared with those ruling at the previous sales, the demand, too, being of a rather disappointing character.

Electrical Publicity.—We have received from the Electric Supply Publicity Committee, 20A, Tudor Street, E.C., particulars of some new publications, including an electric cooking poster, size 25 in. × 40 in., and a coloured postcard reproduction of same. An illustrated folder on the electric iron, and illustrated trade leaflets dealing with "electric irons for laundries," and "electric service for hairdressers," have also been issued, together with reprints of Mr. F. S. Grogan's paper on "The cooking problem—Why electricity is winning." We have also received a folder entitled: "Some electric kitchens, and what the cooks think of electric cooking," from the Westminster Electric Supply Corporation, Ltd., Eccleston Place, S.W., containing 21 4 in. × 3 in. views of electric stoves in different kitchens, mostly of the domestic variety. The illustrations are very instructive, and should bring conviction to those who still doubt the feasibility of electric cooking.

Smoke Abatement Inquiry.—The Departmental Committee on Smoke Abatement sat in public on Wednesday and Thursday this week, and will meet again on June 10th. The secretary is Mr. E. A. Faunch, of the Local Government Board.

The "Paragon" System.—Mr. William P. Durtnall informs us of the successful granting of his American patent in connection with his well-known method of generating variable-frequency polyphase alternating current for electrical ship propulsion, railway traction, and other industrial purposes. This was the result of a recent patent case which Mr. Durtnall successfully contested in America with an engineer, who was endeavouring to get American patents for a similar system. Mr. Durtnall's patent application had two years' priority.

The German patent for the "Paragon" cycle internal-combustion engine has also been recently granted; the engine was described in our issue of January 10th, 1913.

Drawings and tenders for over £50,000 worth of the "Paragon" internal-combustion railway locomotives have recently been submitted to an important railway abroad, where selling rights have been granted to important merchant houses in each territory, and designs are now proceeding for such locomotives with 12 driving axles up to 3,000 H.P., using "Paragon" gas engines as prime-movers, the axles being each driven by a 250-H.P. "Gearless" Paragon motor.

The I.M.E.A. Convention, 1914.—The official programme of the Convention to be held at Birmingham, June 15th to 20th, has now been issued, and includes all the items mentioned in the preliminary announcement given by us on p. 584. Applications for tickets must be made not later than June 8th, to the Secretary, I.M.E.A., 28, Bedford Square, W.C.

Inquiries.—A correspondent asks for the address of the secretary of the Electric Water Polo League. Makers of Francis wall nails are asked for; also makers of Greenfield armoured flexible. Makers of the "Empire" cells are asked for; also makers of submersible lamps, complete with small electric batteries, for fishing purposes at night.

Making Rain.—The Australian Commonwealth radio-telegraph engineer (Mr. Balsillie) has been engaged for some time upon a series of experiments with the object of producing rain by means of a system based upon the principles of wireless telegraphy, and has lodged an application for provisional letters patent for a "device for producing rain." If he can devise a means to stop the rain too, we shall be glad to hear from him in this country also.

The King of Denmark.—At the Royal Command Performance before their Majesties the King and Queen, and the King and Queen of Danmark, at Buckingham Palace on the evening of May 12th, Mr. Ponting showed his series of cinematograph pictures taken during Captain Scott's last memorable journey to the South Pole. "Kinarko" carbons—the only cinematograph arbons of British manufacture—were used.

The "Point Fives."—All those attending the I.M.E.A. Convention who wish to be present at the meeting of the "Point Fives" at Birmingham on June 18th, are requested to communicate with the hon. secretary, Mr. A. Hugh Seabrook, as early as possible. The meeting will be at 10 p.m. at the Grand Hotel.

"F" Rays.—Reports from Italy once more allege that Signor Ulivi has successfully exploded floating mines from a distance with "F" rays. Demonstrations were made at Havre a year ago before the French authorities, but the latter did not purchase the invention.

OUR PERSONAL COLUMN.

The Editors invite electrical engineers, whether connected with the technical or the commercial side of the profession and industry, also electric tramway and railway officials, to keep readers of the ELECTRICAL REVIEW *posted as to their movements.*

Central Station Officials.—The following appointments have been made by the Nelson Corporation:—MR. W. D. CHALMERS, mains superintendent; MR. H. WHITTAKER, assistant station superintendent; and MR. JOHN CRABTREE, shift engineer.

The Kilmarnock T.C. has awarded an honorarium of £100 to the manager of the electricity department in recognition of his services in connection with the promotion of the E.L. Extension Order, and has agreed to increase his salary by £100 per annum.

The Law and Establishment Committee of the Shoreditch B.C. recommends that the salary of MR. C. NEWTON RUSSELL, borough electrical engineer, be increased from £600 to £700 per annum, with a further increase in 12 months of £50, to £750 per annum.

The Birmingham Electric Supply Committee has appointed MR. E. A. MILLS, of the North Metropolitan Electric Power Supply Co., to the post of assistant constructional engineer to the electric supply department, at a commencing salary of £250 per annum, rising to a maximum of £300. There were 194 applications.

Swansea Corporation is recommended to appoint MR. W. H. GEAKE, charge engineer at Greenock, to a similar position at the electricity works at a commencing salary of £115, rising by annual increments of £7 10s. to a maximum of £130.

MR. P. G. CAMPLING, second engineer-in-charge at the Bermondsey electricity works, has resigned his appointment. The Council's Electricity Committee propose to appoint MR. C. J. OAKE, at present third charge engineer, to fill the vacancy at a salary of £130 per annum, rising in two years to a maximum of £140.

The Greenock Corporation received 63 applications, which have since been reduced to 18, for the post vacated by MR. J. A. ROBERTSON, who left last week for Salford. MR. J. H. PARKER has charge of the Greenock undertaking, pending the appointment of Mr. Robertson's successor.

On May 12th, at the electricity works, Worksop, MR. H. A. BEST, chief assistant electrical engineer, was presented with a case of cutlery, on the occasion of his leaving to take up a similar position at Worthing. The gift was subscribed for by the whole of the electricity works staff, and a number of colleagues in other departments. Mr. J. Percival Crowther, manager and engineer, made the presentation. Mr. Best had been associated with the department for over 11 years, and had at all times loyally supported him (Mr. Crowther) in all his schemes; his relations with the staff had always been cordial and pleasant, and he had carried through all his dealings with consumers in a courteous and tactful manner. Mr. Best briefly responded.

At the last meeting of the Worksop U.D.C., MR. M. H. VIPOND, of Leith, was appointed mains superintendent in the electricity department. There were 13 candidates. Mr. Vipond takes the place of Mr. H. A. Best, who, as stated above, goes to Worthing, Sussex. A number of friends belonging to the Worksop Operatic Society presented Mr. Best with a solid silver matchbox inscribed with the names of the characters he has played. Other personal friends presented him with a pipe.

Tramway Officials.—MR. WILLIAM H. TAYLOR, late deputy electrical engineer of Walthamstow, has arrived in Perth, Western Australia, and taken up his duties as electrical superintendent of tramways. He is supervising the building and equipping of the new power station of 9,000 KW., sub-stations, ring main, transmission lines and tramways. The present system of tramways is being considerably extended, and the work is being carried out under Mr Taylor's directions. The consulting engineers for the scheme are Messrs. Merz & McLellan, who have prepared all designs.

Chesterfield T.C. has appointed MR. CHAS. CROSSLEY as tramways superintendent, and increased his salary from £104 to £125 per annum.

General.—DR. KIMURA SHUNKICHI, a Japanese authority on wireless telegraphy, has resigned his position in the Japanese Naval Department, and has opened an office in Tokio as a consulting engineer on the subject.

MR. THOMAS E. ROBERTSON, patent agent, has removed to 43-46, Southampton Buildings, Chancery Lane, W.C.

MR. H. PERKINS has been appointed by MESSRS. FALK, STADELMANN & CO., LTD., Farringdon Road, E.C., as their electrical representative in the Midlands and Eastern Counties.

Obituary.—The death took place on May 12th of MR. PERRY, of the staff of the Isle of Thanet Electric Light and Traction Co., Broadstairs.

NEW COMPANIES REGISTERED.

British Drawn Wire Lamp Co., Ltd. (135,607.)—This company was registered on May 5th, with a capital of £2,000 in £1 shares, to carry on the business of engineers, machinery manufacturers, wire manufacturers and drawers, metallurgists, glass makers and workers, &c. The subscribers (with one share each) are:—L. Strawson, 16, King's Road, Kingston-on-Thames, traveller; W. H. Jackson, 41, Griffiths Road, Wimbledon, engineer. Private company. The first directors are not named. Solicitor: O. B. Thomas, 59, Chancery Lane, W.C.

Collins, Electrical, Ltd. (135,610).—This company was registered on May 5th, with a capital of £500 in £1 shares, to carry on the business of electrical and general engineers, &c. The subscribers (with one share each) are:—C. F. Collins, 12, Alexandra Avenue, Southall, Middlesex, electrical engineer; Marian E. Collins, 74, Somerset Road, Newport, Mon., draper's assistant; Mabel A. Clarke, 14, North View, Brentham, Ealing, W.; Dora A. Hancock, 74, Somerset Road, Newport, Mon. Private company. The number of directors is not to be less than four or more than six: the first are C. F. Collins, Marian E. Collins, Mabel A. Clarke, and Dora A. Hancock. Registered office, 119, Clerkenwell Road, E.C.

Hale, Lowth & Co., Ltd. (135,613).—This company was registered on May 5th with a capital of £800 in £1 shares, to take over the business carried on at 45A, Market Street, Manchester, as "A. E. Hale and Co.," to carry on the business of electrical and mechanical engineers, manufacturers of and dealers in electrical goods, &c., and to adopt an agreement with A. E. Hale. The subscribers (with one share each) are:—A. E. Hale, 59, Haydn Avenue, Moss Side, Manchester, electrical engineer; W. H. Lowth, 89, Lomas Street, London Road, Manchester, electrical engineer. Private company. The number of directors is not to be less than two or more than three; the first are A. E. Hale (permanent special qualification, two-thirds of the shares allotted to him under purchase agreement) and W. H. Lowth: qualification of ordinary directors one share. Registered office, 45A, Market Street, Manchester.

Hudson, Sheed & Towell, Ltd. (135,669).—This company was registered on May 7th, with a capital of £2,000 in £1 shares (1,600 preference and 400 founders'), to carry on the business of manufacturers of, and dealers in, electric light fittings, metal workers, &c. The subscribers (with one preference share each) are:—R. W. Gostick, 27, Walbrook, E.C., chartered accountant; A. W. Hudson, Newman's Yard, rear of 9, Newman Street, W., works manager; A. J. Sheed, Newman's Yard, rear of 9, Newman Street, W., draughtsman, &c.; F. Towell, Newman's Yard, rear of 9, Newman Street, W., secretary, &c. Private company. The number of directors is not to be less than two or more than four; the first are R. W. Gostick, A. W. Hudson, A. J. Sheed and F. Towell (all permanent); remuneration of chairman, £100 per annum for first three years, and afterwards £150 per annum; none for other directors. Registered office, Newman's Yard, rear of 9, Newman Street, W.

Mies' Electric and Chemical Culture, Ltd. (135,622).—This company was registered on May 5th, with a capital of £10,000 in 16,000 7 per cent. cumulative preference and 24,000 ordinary shares of 5s. each, to take over certain patent rights relating to electrical and chemical culture, &c., and to carry on the business of agriculturists, horticulturists, nurserymen, chemical and fertiliser manufacturers, &c. The subscribers (with one share each) are:—R. Mies, 27, Pond Street, Hampstead, N.W., electro-agriculture expert; T. C. Winfield, 56, Denman Drive, Golder's Green, electrical and mechanical engineer. Private company. The first directors are R. Mies (managing director) and T. C. Winfield. Registered office, 37, Piccadilly, W.

Manchester Cable Co., Ltd. (135,621).—This company was registered on May 5th, with a capital of £1,000 in £1 shares, to carry on the business of electrical and mechanical engineers, manufacturers of electrical and general engineering appliances, &c. The subscribers (with 50 shares each) are:—H. D. Stamar, 105, Market Street, Manchester, electrical engineer; H. Lomax, 105, Market Street, Manchester, electrical engineer. Private company. The number of directors is not to be less than two or more than three; the subscribers are to appoint the first directors; qualification, £50. Secretary: H. Lomax. Solicitor: C. Barber, 23, Park Row, Leeds.

Rathkeale Electric Lighting and Power Co., Ltd. (4,142).—This company was registered in Dublin on May 8 h, with a capital of £3,000 in £1 shares, to carry on the business of an electric supply company in all its branches. The subscribers (with 12 shares each) are:—J. F. Cosgreave, Rathkeale, Co. Limerick, solicitor; C. Langford, The Abbey, Rathkeale, Co. Limerick, gentleman; E. A. Whelan, Abbeyview, Rathkeale, Co. Limerick, pharmaceutical chemist; T. Costello, Rathkeale, Co. Limerick, auctioneer; J. J. O'Mahony, Rathkeale, Co. Limerick, merchant; J. Norman, Rathkeale, Co. Limerick, merchant; Dr. T. Magner, Rathkeale, Co. Limerick. The number of directors is not to be less than three or more than seven: the first are J. T. Cosgreave, E. A. Whelan, C. Langford, T. Costello, J. J. O'Mahony, J. Norman and Dr. T. Magner; qualification, £12. Registered office, Rathkeale, Co. Limerick.

Excelsior Aluminium Solder Co., Ltd. (135,722).—This company was registered on May 11th, with a capital of £1,000 in £1 shares, to take over the business of solder manufacturers and merchants carried on by the Excelsior Aluminium Co., at Brookfield Works, Gorton, Manchester, and to adopt an agreement with D. Powell, E. Greenwood, T. Gee, A. J. Orr and A. W. Robinson. The subscribers (with one share each) are:—A. J. Orr, Newholme, Albert Road, Whalley Range, manager; E. Greenwood, 227, Belle Vue street, West Gorton, clerk. Private company. The number of directors is not to be less than two or more than five; the first are D. Powell, E. Greenwood, A. J. Orr and A. W. Robinson (all permanent); qualification, 100 shares. Registered office, Brookfield Works, Gorton, Manchester.

CITY NOTES.

Anglo-Portuguese Telephone Co., Ltd.

Mr. Herbert Allen presided on Tuesday at the London Chamber of Commerce over the annual meeting. He said that this was supposed to be a time-saving age, and telephones, except in this country under the Post Office, were perhaps the greatest time-saving thing of all. Therefore it was only right that the Telephone Co. should be selected for an innovation in order to save time, and so he proposed that his remarks with regard to the report should be taken as read. He was not aware of any precedent of this course, but he saw no objection to it.

The Chairman, in the course of his prepared statement, said the report contained one or two features of such exceptional interest that he would make only brief allusion to the operations of the past year. They once more broke all previous records in the gross income, which amounted to £67,893, an increase of £4,974 on the previous year. Expenses were proportionately rather heavier, mainly in consequence of their having to take on a large number of new employés in preparation for the opening of their new Lisbon Exchange, and to a lesser degree owing to an all-round increase of salaries and wages. They had of late been practically free from labour troubles, and a better spirit seemed now to prevail amongst the working classes in Lisbon and Oporto than for some years past. Let them hope for their sakes it would last. The general situation in Portugal at the present moment was more satisfactory than during any time last year, when they were constantly having political unrest, movements for the restoration of the monarchy and agitations of one sort and another. Their profits, at £26,535, showed an increase for the year of £1,010. The number of subscribers increased during the year by 790, after allowing for withdrawals, and was now 7,810. The total number of calls was 22,056,074, against 17,993,503 in the previous year, and the average public cost per message about ¾d., being less even than in the previous year. The Portuguese public could have no better evidence than this of the splendid service they got from this company and the splendid value they got for their money. It was now 27 years since the company started business, with a gross income of £4,934, and a profit of £1,695, derived from 1,423 subscribers. Besides this, he had prepared a little table, which would show how their operations of the past year compared with those of 10 and 20 years ago:—

	Gross income.	Net profit.	No. of subscribers.	No. of calls.	Average cost per message.
1893 ..	£15,048	£4,572	2,271	1,360,771	90d.
1903 ..	24,232	7,075	2,556	2,471,978	85d.
1913 ..	67,894	27,369	7,810	22,056,074	73d.

Their business extended throughout Lisbon and Oporto—covering a radius of 30 km. in the former case, and 20 km. in the latter—and they served a population of about 750,000 people. In both cities they experienced from year to year an almost continually uninterrupted expansion of business. Their concession ran until 1937, and contained satisfactory provisions for compensating them in the event of the undertaking ever being taken over by the Portuguese nation. Their relations with the national and local authorities were quite satisfactory, and on the occasion of Mr. Kerr's frequent visits to Portugal, he found the Ministers most courteous and obliging and ever ready to give the company every possible assistance. From the profit and loss account they would see that after paying royalties to the Government amounting to £1,977, £3,834 for debenture interest and redemption, and £940 for income-tax, and bringing forward £5,609 from the previous year, they had at their disposal £27,369. It followed, therefore, that with an encroachment of only £631 on their reserve fund or other resources they could pay the dividend and bonus of 28 per cent. which they recommended in the report. This, however, was not the course they proposed to adopt. During the past year an independent valuation had been made by Messrs. Gill & Cook, their consulting engineers, of all the company's property, with the result that the reserves which they had built up were found to be considerably in excess of the depreciation which it was designed to meet. The board therefore felt that there was no need on this occasion to make the usual contribution to the reserve, but, on the contrary, that they were justified in returning a little of it to the shareholders. They, therefore, proposed to take £7,503 from the reserve, add it to the disposable profit balance of £27,369, pay a dividend and bonus of 28 per cent., amounting to £28,000 of which they had already received 4 per cent., or £4,000 by way of interim dividend—and carry forward £6,869. The reserve fund had been built up out of undivided profits during the last seven years or so. It was not, in the strictest sense of the word, a reserve fund at all, inasmuch as it was not invested outside the company's business or existent in any tangible shape. It largely represented revenue moneys spent on capital account, and to that extent was a set-off against any depreciation which might have been taking place on the capital work of earlier years. The reserve fund was primarily a reserve against depreciation; he did not say they would not be justified in dipping into it—pretty freely, if need be—for general purposes—but primarily it was a depreciation fund. The practice with many telephone companies was to utilise the surplus, after payment of dividends, in writing down capital expenditure by a sum which they considered equal to the depreciation of the year and placing a small balance to reserve for general purposes. In their case they generally left the capital expenditure untouched and built up a nominal reserve fund which at any moment might be applied, either wholly or in part, in writing down capital expenditure to its depreciated value. It was not unlikely that in future they might adopt the more general practice, and, instead of building up a so-called reserve which was merely a book entry and liable to mislead the unthinking, create a small reserve for contingencies and write off depreciation year by year. It was probably all the same in the long run, but at times the appearance of a large nominal reserve gave the balance-sheet a somewhat misleading appearance. On one occasion a few years ago they did write down the capital expenditure by a transfer of £20,000 from the reserve, and possibly they might do something of the kind again next year. At the present moment the fund was £62,500; they were now appropriating £7,500 toward the 20 per cent. bonus; and a year hence they would have the balance of £55,000 to deal with, besides the surplus profits of the year. In the meantime the valuation made during the past year by Messrs. Gill & Cook satisfied the board that the reserve fund was well in excess of the actual depreciation in the physical assets as a whole. Another interesting subject mentioned in the report was the proposed issue of 50,000 new shares. The capital expenditure in 1913 amounted to £25,498, and was higher than in any previous year. That, of course, was accounted for by the heavy expenditure in connection with their new exchange in the north of Lisbon, which it was reasonable to expect would enable them to cope with their constantly-expanding business for some years to come. Not that they were at all averse to continual capital

expenditure so long as it brought them a reasonable return. In the last eight years they had spent on capital account altogether about £105,000, although in the same period they had incurred no fresh capital liability either on share or debenture account; on the contrary, they had simultaneously reduced the debenture debt by over £10,000. They might ask where they had obtained the money. Well, the greater part, of course, was represented by surplus profits which had been put back into the business; next, there was their increased indebtedness to manufacturers and others; and the balance had been met by temporary loans. None of them cared for temporary loans, which had a bad habit of falling due at inconvenient moments, and they could not go on indefinitely building up liabilities to manufacturers and others; the directors therefore felt that the time had come for making a further issue of shares, and this they proposed to do forthwith. The issue would consist of 50,000 shares, which would be made at par, and offered in the first instance to the existing members of the company. They had not thought it necessary to incur the expense of underwriting the issue, as it was tolerably certain that the majority of the shareholders would take up their quota, but such shares as might be left over would be taken up or placed by the directors under the discretionary powers with which they were invested. When this issue has been made, the subscribed capital would be £150,000, and whether measured by the magnitude of the business or by comparison with that of other similar companies, he did not fear that it could be regarded as excessive. Their plant was all well up to date and in good condition, and most of their wires were now underground. He had been asked whether they were likely to be able to maintain the present rate of dividend on the enlarged capital, and saw no reason for misgiving on this score, or why the new capital should be less remunerative than the old. It was true their new exchange in Lisbon—with its capacity for 6,000 subscribers—was not yet finished, and in that respect the business of the current year might not get much help, but in other directions their business was continually expanding. Possibly their next interim dividend might be only 3 or 3½ per cent., but it need not necessarily follow from that that for the present year as a whole they would pay less than 7½ or 8 per cent., and once the new exchange was in full swing, the 8 per cent. dividend which they had almost come to regard as a settled thing should be tolerably safe.

MR. CHARLES WOOLLEY seconded the motion, and after some complimentary remarks by MR. HIBBERT, the report was adopted.

The whole proceedings, including the formal business of re-election of the directors and auditors, and a vote of thanks to the board and staff, lasted 15 minutes.

Kidderminster and District Electric Lighting and Traction Co., Ltd.

THE directors' report for 1913 states that the capital expenditure on electric supply was increased by £2,317. The gross receipts, including the dividend on the shares held by this company in the Kidderminster and Stourport Electric Tramway Co. and the receipts from motor-omnibuses, aggregated £11,605, which, with £414 brought forward, makes £12,020, compared with £11,050 for 1912. After deducting all expenses (including debenture stock and other interest) there remains an available balance of £3,409. It is proposed to put to renewals fund £1,000, dividend on cumulative preference shares for the year requires £1,500, a dividend at the rate of 1½ per cent. per annum on the ordinary shares requires £705, and £204 is to be carried forward. The company has ordered 10 motor-omnibuses to develop traffic in outlying districts. Pending delivery eight motor-omnibuses have been hired. The report is accompanied by a copy of the accounts of the Kidderminster and Stourport Electric Tramway Co. for the year 1913. The capital expenditure shows an increase of only £30. The gross receipts were £6,369, a decrease of £130, and the expenses, before providing for renewals, £3,352, an increase of £160. The profit on the year's working, after providing for renewals, is £2,016 plus £43 brought forward. There has been applied to reserve £500, to dividend at the rate of 2½ per cent. £1,430, and £129 is carried forward.

MR. C. S. SHIBREFF HILTON presided on Monday over the annual meeting held at Electrical Federation Offices, Kingsway. He said that the additional capital expenditure of £2,224 had been principally expended in the purchase of additional machinery and boiler for the power house. The revenue showed a net increase from sale of current of about £380. Generation expenses increased by £150; maintenance by £270; and management expenses by about £420, due to increased salaries. The net balance showed a decrease of £113. The dividend from the Kidderminster and Stourport Electric Tramway Co. was less by 1 per cent. or £560. They had charged the cost of inaugurating motor-omnibus services, amounting to £535, to the net revenue account, and he hoped that those 'buses would prove a great success and bring them a considerable revenue in the current year. It was proposed to have a separate company for that business and combine it with the services of the Worcester Electric Traction Co. They would hold shares in that company, and the directors would be jointly elected by the Worcester Co. and the Kidderminster Co. The amount written off for inaugurating the motor-'bus services would not have been so large had it not been for the competition which they had to face at rather an unfortunate time, but all the indications were that those 'bus services would pay the company very well in the future.

MR. J. A. LYCETT seconded the motion, and the report was adopted.

Lancashire Power Construction Co., Ltd.

THE directors' report for the 15 months ended March 31st, 1914, states that it has been deemed advisable (in order to bring into this company's accounts any dividends declared by the Parliamentary company, whose financial year ends on December 31st) to effect a change in the date of the company's financial year. To bring this about the present accounts cover a period of 15 months to March 31st, 1914. The output of the Parliamentary company has continued to increase so rapidly that it has been necessary to provide additional plant for that company's generating station, as well as capital for considerable extensions to mains and sub-station equipments. Of the proposed issue of £100,000 of prior lien bonds referred to in the last report, £55,000 has been subscribed and allotted, and it is intended to issue the balance of £45,000 during the present year, making the total issue of prior lien bonds £150,000.

The trading profit of the Lancashire Electric Power Co. for the year 1913 amounted to £22,785, plus interest on hire-purchase plants, &c., £741, making £23,526, compared with £15,374 for 1912. The balance brought forward from 1912 was £3,137, making the amount available for division £26,663, which has been allocated as follows:—Debenture interest, £4,500; reserve fund, £10,000; dividend of 3 per cent. on share capital issued, £11,744; carried forward, £419. It will be see from the aforesaid figures that the position of the Parliamentary company, as the result of the year's operations, has materially improved, and that, for the first time, it is in a position to pay a dividend on its share capital. The development of the business is indicated in the following figures:—

	1909.	1910.	1911.	1912.	1913.
Units generated ..	9,251,831	13,646,807	17,771,936	23,110,807	28,191,442
Max. load in KW. ..	3,820	4,690	5,530	6,730	9,730
H.P. connected ..	7,710	10,600	13,600	16,400	23,900
Receipts	£15,294	£24,952	£32,726	£42,773	£54,515
Expenditure ..	15,164	18,467	22,031	28,156	31,730
Profit on trading ..	130	6,485	10,695	14,617	22,785

The revenue from all classes of supply dealt with by the Parliamentary company has steadily increased; the Salford Corporation bulk supply contract did not, however, benefit the accounts to any considerable extent, as the supply was not commenced until October, and then only on a small scale. A much larger supply is now being taken. The outlook for the present year is distinctly encouraging; whilst it is true that there is a certain amount of depression in the textile industry, this has not yet had any adverse effect on the company's output. On the other hand, the various new contracts entered into during the past year are exercising a beneficial influence on both the output and profit for the current year, and the results of the first two months of the year 1914, compare very favourably with the corresponding months in 1913.

Turning now to the revenue account of the Lancashire Power Construction Co., Ltd., the total receipts for the 15 months amount to £24,382, and after deducting therefrom the expenditure of £17,896, there is available £6,486, which it is proposed to allocate as follows:—Write off balance at debit of revenue account at December, 1912, £2,613; reserve account, £3,873.

Stock Exchange Notices.—Applications have been made for official quotations in the following:—

Cuban Telephone Co.—Further issue of £105,000 5 per cent. first mortgage convertible bonds.

Eastern Telegraph Co., Ltd.—Further issue of £103,294 4 per cent. mortgage debenture stock.

Brisbane Electric Tramways Investment Co., Ltd.—The directors' report for 1913 states that the dividends on the shares held by the company amount to £115,922. After deducting general charges in London and expenditure in Brisbane, including insurance, there remains a net balance available of £115,848. £40,000 has been added to reserve fund, and the total dividend on the ordinary shares is 8 per cent. for the year, carrying forward £3,123. In order to provide for the cost of extensions, &c., the directors recommend the issue of 30,000 new ordinary shares of £5 each, to be offered at par to the ordinary shareholders.

Wolverhampton Electric Construction Co., Ltd.—The directors report a net profit for the past 10 months, after providing £5,666 for debenture interest, and £5,000 for depreciation, of £27,126. After paying 7 per cent. preference dividend 6 per cent. is to be paid on the ordinary shares for 10 months.

Craigpark Electric Cable Co., Ltd.—Mr. W. S. Brown, who presided at the annual meeting, held in Glasgow on May 13th, said that the balance-sheet this year was the most satisfactory they had had. That was partly due to the natural growth of business. The company had had a good share of the prosperity which had taken place in the trade of the country. In addition, they had not been harassed by severe fluctuations in the price of copper and rubber, as they had been in the past. Prof. Maclean seconded, and the report was adopted.

Castner-Kellner Alkali Co., Ltd.—An interim dividend of 5 per cent. for six months ended March 31st last is announced.

Allmäna Svenska Elektriska A.-B.

The annual report of this company has recently been published and it gives some very interesting details about the activity during 1913. The capital, which was £100,000, has been increased by the issue of a new series of shares to £666,667, but the new issue will not be entitled to any dividends before next year. The results are very satisfactory and a dividend of 8 per cent. had been distributed. In the following table are shown the gross and net profits and expenditure for the last four years:—

	1910.	1911.	1912.	1913.
	£	£	£	£
Gross profits	30,889	42,167	50,667	90,556
Expenses	6,056	13,611	14,778	42,611
Net profits	24,833	28,556	35,889	47,945
Depreciation	15,889	16,444	20,722	30,000
	30,889	42,167	50,667	60,556
Actual gross profits	46,778	58,611	71,389	90,556

The reserve fund was at the end of 1912 increased from £19,444 to £23,667. When the capital was extended, there was at the same time undertaken a financial reconstruction of the company, which consisted in the withdrawal of the preference shares and the founder shares. All shares were instead placed on equal terms as regards dividends, and the reserve fund disappeared in connection with this operation. The new capital was subscribed at 20 per cent. above par, and the amount of this premium enable the company to establish a new reserve fund, amounting to £53,333, which has now been increased to £58,889. In the following table are shown the turnover and other matters for the last three years:—

	1911.	1912.	1913.
	£	£	£
Turnover	711,500	774,000	955,600
Value of goods exported	174,800	212,300	242,500
Number of orders per 31/12/1913	3,689	4,977	6,887
Electrical machines delivered:			
Number	6,011	8,001	10,816
Capacity in kilowatts	220,000	272,000	340,000
Number of workmen employed ...	2,527	2,780	3,287

The difference in the turnover between 1912 and 1913 is very high and the exports are now four times as much as in the said year. In the report it is stated that the demand for electrical goods during 1913 has been very strong, which has had a favourable effect on the prices. During 1914 the home market has shown no sign of depression, while the orders from abroad have decreased in number. The prospects for this year are on the whole satisfactory. The number of orders in hand has risen very considerably, but some of them are not to be executed before 1915. As regards the orders for large electrical plants there are now three generators with a capacity of 10,000 H.P. each, which are to be delivered to the "Alfkarleby" power stations in Sweden. The first generator to the Porjus power station of the State Railways was delivered in December, 1913. From the Norwegian Hydro-Electrical Co. has been obtained an order for six generators of 20,000 H.P. each for Rjukan II., and for two generators of 11,000 H.P. each, which are to be installed at the Svaeljfas power station. In Japan the company has secured an order for six generators with a total capacity of 16,000 H.P. for the Sagami power station, and some large orders from Portugal and Canada have also been obtained. The Domnasfoets Ironworks have placed an order with the company for electrical plant and machinery for a rolling mill of 9,200 H.P. capacity, which is going to be electrified. Further, the company has got an order for four electric motors of 1,600 H.P. each for the Holsta Paper Mill in Sweden. The electrification of the Såltsjö Railway, near Stockholm, has now been completed and the electric plant is working very satisfactorily. The transmission and conducting lines for the railway from Kiiruna to Riksgränen in North Sweden are nearly completed, and the electrical locomotives for same are also approaching completion, so that the whole line will be operated electrically in the course of this year. The A.S.E.A. has several subsidiary companies, of which the Swedish Company, the A.B. Skandinavika Elektricitetsverk is the most important. In Norway the A.S.E.A. and the Elektrisk Bureau of Kristiania have formed a new company under the name of the A.S. Norsk Motor and Dynamofabrik with a capital of £55,600. The factory buildings at Hasle, near Kristiania, are now under construction. The Danish branch has been turned into a new company with a capital of £5.555. The A.S.E.A. has also subsidiary companies in Finland, Spain and England, and has now also opened branch offices at St. Petersburg. All the foreign companies are ordinary trading concerns with the exception of the Norwegian company, which is a manufacturing concern.

Last year it was reported that the A.S.E.A. would very likely find a dangerous competitor in the German A.E.G., which had the intention of erecting a large branch factory at Malmo. The necessary sites were acquired at Malmo by the A.E.G., but so far no further steps have been taken in order to realise the project. In regard to competition, the A.S.E.A. has always pursued the policy of keeping its hands free, and has consequently made no agreements with the large foreign electrical companies in regard to the fixing of prices and the division of markets, etc. It has followed a policy of free competition everywhere. The company last year took up the manufacture of electrical cooking and heating apparatus, and its manufactures have now been put upon the market and are expected to become dangerous competitors of the German goods which previously were dominating the Swedish market.

Rangoon Electric Tramway and Supply Co., Ltd.

The directors' report for the year 1913 states that in order to meet the growing expansion of the business it has been found necessary to raise additional funds; the board have created £300,000 five per cent. second mortgage debenture stock, of which an issue of £100,000 was made in November last and fully subscribed. The balance of the new issue of debenture stock will be issued as and when required. The cars travelled 1,499,760 miles, an increase of 37,475 miles, and carried 11,427,556 passengers, an increase of 794,228; the total receipts being Rs. 9.41,935, an increase of Rs. 51,613 or 5.79 per cent.

Towards the end of the year the directors commenced a service of motor omnibuses, which in addition to acting as feeders to the tramways, will also, it is hoped, supply a want for transport of a more elastic nature than the tramway service. It would be premature to say what the financial result of motor omnibuses will be. They bid fair to supply a want, but the expenses of operation have yet to be ascertained.

In the private lighting and power department, the gross receipts for current supplied of all descriptions amounted to Rs. 5.77,035 as compared with Rs. 4.80,232 in 1912, an increase of 20.16 per cent.; the working expenses were 42.16 per cent. of the receipts, as against 45.10 per cent. for the previous year.

The gross receipts of the house wiring and supply department amounted to Rs. 1.20,828 as compared with Rs. 1.64,571 in 1912, the profit realised being Rs. 22,478 as compared with Rs. 33,161 in 1912. Although the profit is less than for the previous year, the department continues to carry out efficiently the objects for which it was originally founded.

A continuation of settled economic conditions of trade in Burma, upon which the success of this company so largely depends, has again resulted in the directors being able to present a satisfactory report to the shareholders.

The gross profits for the year were £60,710. Interest on debenture stocks absorbs £9,107, provision for redemption of 4½ per cent. debenture stock £5,875, depreciation on sundry assets in Rangoon £1,024, transfer to reserve for renewals account £12,500, transfer to special reserve for cables, etc. £2,000, income tax, balance of, £471, fees for directors, managing director, and trustees and expenses in London £2,540, expenses of 5 per cent. debenture issue, proportion written of, £1,405. The net profit is £25,924, plus £751 brought forward. Preference dividend absorbs £15,000, and a dividend on the ordinary shares of 6 per cent. for the year is recommended, leaving £1,055 to be carried forward. During the eight years of the company's existence, the total dividend paid upon the ordinary share capital has amounted to 22½ per cent., being an average return of 2.81 per cent. per annum to the holders of ordinary shares.

The annual meeting was held on May 6th at 3, Great Winchester Street, E.C., Mr. Frank Tobin presiding.

The Chairman said that the future redemption of 4½ debenture stock would probably proceed more rapidly, and it was important to bear that in mind because, as that stock was wiped out, the position of the recently issued 5 per cent. second mortgage debenture stock would steadily improve. He hoped that the issue of £100,000 made last autumn would supply their needs as regarded capital expenditure for the next two years. The profits last year were the largest they had yet made, and they had been attained with the accompaniment of increased economy. With regard to their industrial progress during the past twelve months, that had been mainly in that branch of the business which dealt with the supply of light and power. The tramways had done very well and had given them increased earnings, but they still stood at the same 25 miles of track as originally, and any increase in that part of their business could only be moderate. It had done better last year than in 1912; it had earned more, and it was very satisfactory to know that the board had succeeded in their aim of working the tramways for 50 per cent. of the gross takings. For 1913, he was glad to say, they had been able to keep just within those figures. As regarded the light and power business, the increase last year had been very considerable, and he thought they might fairly confidently hope that there would be a continuance of the demand for an increased supply of light and power. It was chiefly the development of that part of the business that had led to their issuing further capital. They were spending a considerable amount at the power house, for, although they had sufficient power for what they were supplying now, the business was growing all the time. Rangoon relied upon the company to supply the city with all the electric light and power it needed, and the board could not afford to take any risk of breakdown—they had to keep a larger margin in reserve than was necessary in the case of a company working in England. The board felt justified in recommending a dividend of 6 per cent. on the ordinary shares; this was the first year they had been able to declare such a large dividend. In conclusion, the Chairman paid a tribute to the staff in India for the zeal and ability with which they served the interests of the company.

Sir Frederick Fryer, K.C.S.I., seconded the motion, which was carried without discussion.

Lima Light, Power and Tramways Co.—The report shows a net profit of £p99,597. The total dividend for the year is 4½ per cent., and there is carried forward £p184.

Eastern Telegraph Co., Ltd.

The annual meeting was held on May 13th at Electra House, E.C., Sir J. Wolfe Barry, K.C.B., presiding.

In moving the adoption of the report (Elec. Rev., p. 793), the Chairman said that the gross revenue for the year amounted to £1,462,800, a decrease of £37,200. The falling off in the message receipts appeared to be fairly general, but the largest decline was shown in the receipts from the Indian joint purse, which were about £18,000 less than in 1912. There were smaller decreases in most of the other branches of the traffic, but he was pleased to notice a slight increase in the receipts from South Africa. When comparing the revenue for the two years they must remember that the revenue for 1912 was the largest ever received by the company. Considerable reductions had recently been made in certain of the telegraphic rates, some of which came into operation on 1st September last, and consequently affected the revenue for the year, as up to the date of the accounts the traffic had not been materially stimulated by the reduced rates. The principal reductions then made were as follows: Between Great Britain and Hong Kong, China and Philippines from 4s. 5d. per word to 3s. 6d. per word; between Great Britain and Japan from 4s. 10d. per word to 3s. 11d. per word; between Great Britain and Straits Settlements from 3s. 6d. per word to 2s. 11d. per word; between Great Britain and Dutch East Indies from 4s. per word to 3s. 7d. per word. A further reduction in the tariff between Europe and India, Burma and Ceylon had been made from 2s. per word to 1s. 8d. per word, which came into force as from the 1st instant. All these reductions might have a considerable effect on the receipts and expenditure in the current year, and it was to be hoped that the volume of additional traffic would be increased by reason of the lower tariffs. Additional facilities had also been given to the public by extending the acceptance of "week-end" telegrams to various parts of the world. By arrangement with the other administrations interested, these telegrams were delivered on Tuesday morning, but so far as they were concerned they would be glad to see the privilege still further extended by delivering these messages on Monday morning. The total expenses for the year amounted in round numbers to £685,200, an increase of £23,000. If, however, they deducted the special expenditure in respect of interest on temporary loans, amounting to £10,600, necessitated by the large expenditure on account of important renewals and for new cables between Suez, Aden and Colombo, the increase in the ordinary working expenses for the whole year was only £12,400. The expenses in London showed an increase of £1,500, while the working expenses at stations had increased to the extent of £25,400, of which £23,614 was due to salaries and wages, and was consequent upon a considerable but necessary augmentation in the number of the staff, to annual promotions, and to improved conditions in connection with Sunday duty and overtime. The expenses attending maintenance of cables were, however, £14,975 less this year than they were in 1912, this being due to the fact that the credits to this account in respect of the charter of their ships, etc., were considerably in excess of the corresponding credits in 1912. The net result of the year's working was that, while maintaining their usual dividend and bonus, together equal to 7 per cent. on the ordinary stock, they were able to make a substantial contribution of £330,000 to the general reserve fund. That fund had been charged with £439,761 in respect of the new cables between Suez, Aden and Colombo, combined with extensive renewals of cables in the Red Sea and Indian Ocean, and further expenditure in respect of the new cables had been incurred to the extent of £473,026, which would be charged to the fund, as and when they were able to clear off the liability in respect thereof, without, they hoped, realising any of their reserve fund investments for the purpose. It was considered expedient to vary some of the investments held in respect of reserve funds, and the realised loss incurred on the securities sold had been charged against the general reserve fund, leaving the fund £325,000 intact as a provision on account of investment fluctuations. The operation had resulted in a slightly improved return on the re-investment of the proceeds of the sale. On valuing their securities as at the date of the accounts, they ascertained that the approximate depreciation was still slightly in excess of the above mentioned amount of £325,000. There had been a considerable improvement in the total value of the securities since that date, but they thought it was advisable to leave the amount of this provision undisturbed. During the last 30 years they had charged against reserve fund for new cables alone no less a sum than £4,246,006, and the only addition to capital expenditure on this account during the same period had been £540,595. The total amount charged against reserve fund, including new cables, renewals of existing cables, making provision on account of investment fluctuations, and other special expenditure, was £5,837,202, and the balance remaining in the general reserve fund at 31st December last was £1,559,798, and the total reserves as shown on the balance sheet aggregated £2,258,655, apart from the special fund set aside as a provision on account of investment fluctuations. Not only were these figures interesting and instructive, but they enabled them to realise fully what an important bearing this practice must have had upon the satisfactory financial position of the company. It also showed that they were constantly endeavouring to improve their system and attain greater security against interruption, not only in times of peace, but in the event of war, by establishing alternative routes and at the same time bringing fresh places into direct telegraphic communication with their main lines, such as, for instance, they had lately done with Colombo. They believed this policy, which had been so consistently followed for so many years, to be in the common interest of all concerned, and while securing not only a fair but a regular return to the stockholders on their investment, it enabled them to fulfil their obligations as public servants by offering greater facilities and reducing rates whenever it was reasonably possible to do so. Although it did not invariably follow that a reduction in the rate created more traffic, they always endeavoured to lower their tariffs if it were not considered likely to cause a very serious reduction in their revenue. It must always be borne in mind that whenever a reduction of rates did produce an increase in the volume of traffic, this invariably brought in its train an increase in working expenses.

Sir John Denison-Pender, K.C.M.G., seconded the resolution and the report was adopted without discussion.

Callender's Cable and Construction Co., Ltd.

Sir J. F. Fortescue Flannery, M.P. (Chairman) presided on May 14th, at Hamilton House, over the annual meeting.

The Chairman, in moving the adoption of the report (see Elec. Rev., p. 793), said that in the years 1912 and 1913 there had been a history of abounding commercial prosperity throughout the whole civilised world. He did not think that history recorded a time of greater commercial and manufacturing activity. During both these years their company, by reason of its highly-organised system of management, had been able to obtain its full share (some people said more than its full share) of business more or less profitable. Not only in regard to the large number of small orders, which represented the bread and butter of a trade like theirs in quiet times, but also as regarded some big orders, although not so many as in former years relatively, the company had been successful; and at home, in the Dominions and abroad, due to the activity of their management, coupled with prosperity amongst their customers, they had done, as they considered, a very satisfactory year's trading. There were perhaps advances owing to the use of electricity greater than had been made in any other department of science, and these had not been neglected by the professional officers of the company, and they had kept themselves, they believed, in the front rank of scientific as well as commercial progress. In 1912 they had a record as regarded the profitable results of their trading. They had a balance of £97,000 to their credit, and in 1913 they had a balance of £91,000. Electricity, as he had said, had developed, and possibly the developments in mines and factories and railways, in general traction, telegraphs and telephones, had been as widespread as in any previous year. It was in regard to telephones that they might claim to have made some very special successes in the course of their work. Especially they had been successful in their relations with the General Post Office, who had taken over the telephone service—not always to the praise and kindly words of those who used it. But they believed that the deficiencies in the use were likely to disappear in the very near future, and certainly as regarded the apparatus with which they were concerned, which, indeed, would spread over a very large area of England, the company was doing its best to second the efforts of the Post Office and to deliver the very best possible material in the shortest possible time. In order to fulfil the contract with the Post Office, and for other purposes, they had laid down some special plant, both at Erith and Leigh, and as an illustration of the thrifty character of the board he might mention that the cost of the plant had been largely paid for out of revenue. They had not been content with a prosperous year, but they were making their arrangements in advance for the lean years which almost certainly must come, and they had taken the opportunity of revising and extending their agencies throughout the world. He ventured to say that there were few large towns in the United Kingdom, few in the Dominion, and practically no civilised country abroad where there was not at the present moment, or would be in the near future, a resident skilled representative of Callender's Cable Co. ready to do business on their behalf. As regarded the Anchor Cable Co., with which they were interested, he was able to report a period of very satisfactory progress. They had seen the dividend declared by the company, and he might add that there was a very considerable surplus not being distributed, but which was being laid up by way of revenue for the future safety and advantage of the shareholders. The maintenance of all their buildings and plant had been, as usual, paid for out of revenue. They might perhaps, with the sanction of the auditors, have treated some of these expenses differently, but they had thought it better to charge them against revenue. Large portions of the capital were invested in electrical undertakings who were customers of the company, and he was able to assure them that the whole of these investments were not only safe and satisfactory, but were in the judgment of the directors in a very improving condition. The Chairman proceeded to deal with the figures in the balance sheet, and pointed out that nothing was put down for goodwill or patents, although they held patents which they regarded as very valuable. Most of the items, he said, did not call for any comment except that they showed the activity of the company and also that every sovereign of the available funds was being actively used in the business. The result was that with

£91,745 brought in from 1912 they had an available balance of £150,000, and after paying a dividend of 10s. per share and a bonus of 5s. per share they carried forward £124,581 to next year's account.

Mr. F. Thompson pointed out that the depreciation only worked out at 2¾ per cent., which seemed very small. He asked whether the value put by the managing director on the shares held by the company was a realisable value or merely an estimated value, and also remarked that he understood the contingent liability in regard to the Uxbridge and District Electric Supply Co. was to have been taken over by the Trust Co.

Mr. Galliott suggested that these profitable years might be a suitable time to establish a fund for the redemption of the company's debentures.

Mr. Stewart Bain congratulated the directors on the success of the business and on what he considered a clean balance sheet.

Mr. T. Callender (Managing Director), in seconding the motion for the adoption of the report, said the feature of last year's trading had been the steady increase of their trade with their old customers. There had not been any wonderful development in the outlook of the electrical trade, but throughout the whole gamut of their customers they had found a steady increase in their requirements from the company, which, they would agree, was the most satisfactory kind of business any company could obtain. During the present year so far as they had gone that same quiet, steady increase had kept on and they were doing at the present time a healthy, quiet increasing business of the best possible kind—much of it with their old and valued friends. The feeling that a considerable slump was taking place in the industry throughout the country had not, fortunately, come their way. His friends in the North of England and Scotland had told him that they had experienced a falling off in their trade, but so far as their company was concerned it had not yet reached them. They had a large amount of business in hand and in prospect, and so far as they could forecast at present the year would be a satisfactory one. It had, however, been necessary in order to hold their position to spend a lot of money in ways which did not appear in the balance sheet or in the list of the reserves they made. They had put up research laboratories at their factory and they had put an immense amount of work in which did not appear outside, but it had put them in the forefront of electrical manufacturers, not only of this country but of the world. They would reap sooner or later the fruit of that expenditure, which had been considerable and had meant much worry to those at the head of affairs. The increasing requirements for electricity in mills and factories and mines should mean good business to them, and if heating by electricity, of which they had heard so much in Mr. Merz's report to the City of London, came along they would receive a very large accession to the already large business they had. Perhaps the only department which had not been altogether satisfactory was the engineering department, for in that they had been harassed a good deal by labour troubles. Fortunately their own men were fairly loyal to them, but the unrest and uncertainty which at present existed in the engineering trade was causing them, and others similarly situated to themselves, the greatest of anxiety and had upset many of the calculations they had made and stopped much of the advance in business which would otherwise take place. Only recently a new branch which promised exceedingly well, but which was mainly an engineering branch, came to them. They had to all intents and purposes decided to extend the factory and go in for extending the business in this new direction, but in view of what had occurred they reconsidered the matter and decided to shut it down. That was a trade which would have given employment to 200 or 300 men at any rate, and which for the present had entirely gone and would probably not take place in this country at all. It seemed a pity that this should be so, but with the present unrest they were bound to turn new business down and wait until sanity once more returned to their great trade unions. The importance of their telephone department could not be over-estimated because they were one of the firms who had been selected by the Government to give effect to their proposals for putting the telephone house in order. There was no doubt that a vast amount of money would be spent in the next few years by the Government in increasing the facility necessary for subscribers to the telephone, and large amounts of cable had already been ordered and were being put underground, and their company had received no insignificant part of these orders. In fact the Post Office had placed in their hands the work in the area south of the Wash to Cardigan Bay. Most of the work in the south of England had been left in their hands. It had not yet brought any large contracts, but it had brought a large amount of work and anxiety, as owing to the special nature of telephone engineering there was not a reserve of men who could be drawn upon to carry out an indefinite number of contracts. They had therefore been forced to supplement the staff already in their service by new men whom they had had to train, which meant heavy expenditure, but they had got together a staff and equipment to enable them to do work second to none in the United Kingdom. Their subsidiary companies were progressing well. Most of these companies were at present under development, and it would not be possible for them to dispose of the shares unless they made some quite exceptional arrangement. These shares were the shares they had to take to make their business. It was part of the expenditure necessary in any company of that kind which carried out large contracts in a more or less new industry. The shares cost them much more than the amount which appeared in the balance sheet. They had already provided large sums to meet any depreciation, and he was convinced that the sum put down in the balance sheet was the proper sum in view of all the circumstances of the case. With regard to the question of depreciation, it must not be forgotten that they had 50 acres of land and there was no depreciation with regard to that, but, on the contrary, there was considerable appreciation. Looking at it all round, they thought the amount they had devoted to depreciation was ample. They could make it appear more if they wished, and if they charged less to renewals account and put it to capital, writing it off afterwards. It was never intended that the Trust Co. should take over the liability which stood on that company with regard to Uxbridge, but he might say that the Uxbridge Co. was doing very well and paying its way. In conclusion he thought the outlook was quite satisfactory.

The motion for the adoption of the report was then carried and the Chairman was re-elected a director.

Potteries Electric Traction Co., Ltd.

The annual meeting of this company was held on Monday at Electrical Federation Offices, Kingsway, Mr. G. F. M. Cornwallis-West presiding.

In moving the adoption of the report (see Elec. Rev., p. 833), the Chairman said the result of the year's trading might be considered satisfactory, for while maintaining the same dividend as last year they were able to set aside to renewals account £3,000 more than in the previous year. The capital expenditure during the year was £3,774. Some of that had been spent in improvements on the tramway track, but by far the greater part had been expended on the purchase of motor omnibuses and further expenditure under that head would be necessary during the coming year; in fact they had already ordered six more 'buses. They were obliged to do it in order to cope with the traffic which was being developed in the district. The total capital expenditure amounted at the end of the year to £791,326, whilst the issued share and debenture capital amounted to £735,000 only. The excess of expenditure over issued capital had been met out of the company's internal reserve funds and other resources. Further capital expenditure would be necessary for doubling certain portions of the lines, extending loops and for the purchase of new rolling stock; but it would depend upon whether the negotiations which were now proceeding with the local authorities for the extension of their tenure were carried through satisfactorily. The estimate of further capital expenditure which they had in their minds was at least £35,000. They would have to consider ways and means to raise that. The only way in which they could raise it would be by some form of mortgage debenture, but it would not be worth while for them to raise the money unless the extension of tenure granted by the local authorities was for such a period that they could see their way clear to create a sinking fund which would pay off the necessary fresh issue of debentures and at the same time if any consent had to be got from the debenture holders, to provide a sinking fund for the existing debentures. It was hardly necessary for him to point out that should that be done it would be ultimately for the benefit of the ordinary and preference shareholders. He was quite certain that the new capital would be able to earn the interest upon it, especially as they had got the motor omnibuses, which, as far as he was able to judge, seemed to be a most healthy part of the company's property. If any sinking fund were created for the debentures they would become automatically extinguished at the end of a certain period and instead of the company's existing assets being used in the event of purchase by the local authority in years to come to pay for the existing debentures, the amount would naturally go to the benefit of the preference and ordinary shareholders. That, he thought, was an important point for the shareholders to consider, because at the present time there was no sinking fund for the debentures. The traffic receipts showed the substantial increase of £9,000, and there was a small increase from parcels and advertising. To some extent that increase must be discounted by the fact that in the early months of 1912 they had to deal with the coal strike which considerably reduced the traffic, and therefore the increase last year must be considered somewhat abnormal when compared with the traffic of the preceding year. They would, however, be pleased to hear that the receipts from the tramways for the first four months of the current year showed an increase of over £500 and they had taken over £2,000 during that period from motor 'buses. On the other side of the account there was an increase of £1,700 under the head of power and running expenses. Of that £1,000 was accounted for by increased wages to their employees, but they were not exceptional in showing an increased expenditure on that account. They had to deplore a considerable increase in the cost of fuel which amounted to over 40 per cent. of the total amount expended under that heading as compared with the previous year, and he was afraid there was very little hope of ever seeing a return to the coal prices they had been accustomed to in the past. In the administration and general

expenses there was a considerable increase in the item for rates, which had risen from £4,386 in 1912, to £5,794 last year. That was an item over which they had no control. The increase was largely due to the re-valuation that took place last year within the Stoke Union. In 1904 that portion of the company's undertaking was valued at £3,923, when the gross traffic receipts were £90,000. The new valuation when the gross traffic receipts were £100,000 had been fixed at £7,225, an increase of £3,302; in other words, although their gross receipts were only up by 10 per cent. the valuers had increased the assessment by very nearly 100 per cent. They had done their best to deal with the matter by appeals but they had not been successful and the only result they had got was a reduction from the original valuation of £7,864 to £7,225. Repairs and maintenance showed an increase of £1,100 and they could not look forward to any reduction in that item. He explained to them at the previous meeting that the directors were building up a fund for the renewal of the track work. During the year £5,200 had been spent upon that account, but considerable further amounts would have to be spent during each of the next three of four years if the negotiations with the Council for an extension of the tenure were successful. In order to provide for that, £15,500 had been set aside out of the profits last year to the renewal account, which made that fund £24,168 at the commencement of the year. In addition to that the general reserve was increased by £2,000 and now stood at £23,000. Referring to the question of motor omnibuses, the Chairman said there had been an enormous increase in motor-'bus services throughout the country, and the Potteries district offered an attractive field for such a form of locomotion. Ten years ago an endeavour was made to utilise motor-'buses as feeders to the tram-lines, but, owing to the many difficulties they encountered, chiefly of a mechanical nature, the 'buses did not prove a success. They were one of the pioneers of the motor omnibus service in this country and the non-success was due to the faulty construction of the vehicles which they had to deal with at that time. Great improvements had taken place in the construction of 'buses within the last two or three years, and they had reliable vehicles which could be worked with success and at a profit. To meet the demand for such traffic in their district the directors last year ordered four 'buses of the latest type and an experimental service was started last December. The result of that experiment offered such promise that they had already increased their fleet to 12 'buses, of which six were in work and more would probably be required in the near future. They had had a certain amount of difficulty in obtaining licences from the local authorities, but he had great hopes that those difficulties would be overcome. The negotiations with the local authorities to which he referred last year were at that time entirely suspended, but at one of their meetings some weeks ago he pointed out that the company, as a business concern, could not possibly give improved services or embark upon an extensive programme of reconstruction unless the directors had the necessary money, and he further pointed out that they could not possibly expect to raise the money unless the time for which their tenure was extended was spread over a reasonable number of years. They were received very favourably by the Estates Committee, and he had hopes that the negotiations would come to a successful issue, which would of course give an increase of life to the company. The proposals were that their tenure should be extended until 1940, which was practically 25 years from now. The company on its part would undertake to carry out certain doublings and effect other improvements to the lines and rolling stock and pay a way-leave, the amount of which had not yet been settled.

Mr. J. Vincent Kitchener seconded the resolution which was adopted without discussion.

West African Telegraph Co., Ltd.

The annual meeting was held on Wednesday last week at Electra House, Finsbury Pavement, Sir J. Denison-Pender, K.C.M.G., in the chair.

In moving the adoption of the report (see Elec. Rev., p. 796) the Chairman said he had first the melancholy duty of referring to the death of Mr. Robert Kaye Gray. Mr. Gray had been associated with the company since its inception, and his practical knowledge of cable work, together with his commercial experience made him a most valuable director. He was, moreover, a man who by his courtesy and kindly manner endeared himself to all with whom he came into contact. They deeply deplored his loss. With regard to the report, the gross receipts for the year amounted to £45,915, as against £46,603 for 1912, or a small decrease of £688. The actual receipts for messages however showed a reduction of £1,146, and the receipts had been made up to £45,915 by the addition of interest and dividends on the reserve fund investments, while moneys on deposit brought them £458 more than in 1912. Those increased receipts from interest on reserves had made up to within £688 the deficiency on the traffic. As far as expenditure was concerned, exclusive of cable maintenance, the total ordinary expenditure amounted to £17,350, as against £17,091, or a small increase of £260. There was nothing to take exception to in that figure. On the contrary, they might congratulate themselves that the increase had been so small. The expenses attending the maintenance of cables however showed a considerable increase, due to the somewhat extensive repairs of their St. Thomé-Loanda cable, so that, adding the cost of cable repairs together with sundry differences in exchange and the income tax payable abroad, it had cost them £5,732 more this last year to work and maintain their cables. That only emphasised what he had so often said at those general meetings warning the shareholders not to congratulate themselves on a reduction small or large in cable maintenance, comparing one year's accounts with another. As he had said, last year they were faced with an expenditure of £12,150 against £6,818 for 1912, meaning an additional expenditure of about £5,000. Still, the result of the year's working had been satisfactory. They were making a contribution of £6,000 to the general reserve fund while maintaining the same dividend as in previous years. Although the general reserve fund had been charged with £5,600,000 in respect of the renewal of a portion of the St. Thomé-Loanda cable, the fund stood at £296,800, taking the securities at cost price. Of course there had been a considerable depreciation on those securities, but all the same it was a very fine reserve fund considering the capital of the company.

Sir Henry C. Mance seconded the motion and the report was adopted.

Shanghai Electric Construction Co., Ltd.

The annual meeting was held on May 14th at Basildon House, E.C., Sir Alfred Dent, K.C.M.G., in the chair.

The Chairman, in proposing the adoption of the report (see Elec. Rev., p. 831), said that it showed continuous progress and development in the undertaking. The operating profit was £37,976 as compared with £27,161. The balance of net profit available amounted to £36,700 against £28,000. The reserve for renewals would amount to £27,727. The power expenses were £10,794 against £13,137 last year, a decrease of £2,342, owing to the revision of the rates. They were entitled to claim that revision under clause 10 of the original power agreement after five years, and they gave notice accordingly in 1913, but the negotiations extended over the whole year before an arrangement was arrived at with the municipal council. The effective receipts showed an increase of £12,227, and it was a satisfactory feature that of that amount £10,814, or 88 per cent., had been retained as operating profit. That was partly attributable to the reduction of the cost of power and to the fact that the growth of expenses had been less in proportion to the gross earnings, notwithstanding that they had run nearly 137,000 more car miles than in the previous year. The expense ratio to effective receipts had been reduced from 65½ per cent. to 58½ per cent. That included the 5 per cent. royalty on the gross receipts which they had to pay the municipal council and also the heavy loss on exchange. Those items should be excluded when comparing their ratio with systems in other towns not similarly penalised, and in that case it would work out at 42 per cent. for 1913 against 47 per cent. for 1912. The average expense ratio to gross receipts over all the tramways in the United Kingdom for 1912-13 was said to be 62.68. The loss by depreciation on subsidiary coinage during the year was equal to 23.19 as compared with 24.55 per cent. in 1912, or 7.64 per cent. of the share capital. That showed a slight improvement per cent. in the currency itself, which, he feared, would not be continued in 1914 as the market was again being flooded with copper coin from the native mints. That loss on exchange was a new feature since the tramway concession was granted in 1905, and it had cost them since the service was established over £100,000. The ratio to their capital had increased from 3.63 per cent. in 1909 to 8.09 per cent. in 1913. In spite of that serious handicap they were able this year to recommend a dividend of 7 per cent. against 5 per cent. for the previous year. They had also set aside £10,000 to renewals account and had written £3,000 off preliminary expenses. The directors and auditors considered that the provision for those two items was prudent, if not necessary. On the general question of finance they would notice that after providing for a considerable sum on capital expenditure, the loan from the bankers stood in the balance sheet at £16,000. It had since been reduced to £12,000, against which they were expecting substantial remittances from Shanghai. There was, however, a further expenditure on capital account in contemplation for which provision would have to be made when the necessity arose. They had outgrown their present office accommodation, and unless they could extend their present lease and the premises themselves on reasonable terms it was doubtful whether they would not be compelled to buy land and build on their own account at no distant date. They also could not estimate the capital requirements for the development, if thought desirable, of railless traction as, owing to the deplorable delay in delivery of the cars they had not yet had an opportunity of testing how far that new mode of traction could be made applicable to Shanghai. He was glad to say that that morning they had received a telegram from Liverpool stating that the first two cars would be despatched on the 21st inst. The traffics showed continued expansion as they carried nearly seven million more passengers last year than in 1912, and the published traffics receipts for the current year had so far shown a satisfactory increase every week without exception. They had added 15 new motor cars during the year, the bodies of

them having been built in their own workshops at Shanghai; the trucks or chassis being of a new type supplied by American manufacturers. They had also recently authorised the purchase of a further 10 motor cars and 15 trailers, which would bring their rolling stock up to 90 motor cars and 55 trailers as compared with the original stock of 65 motor cars only. There would be full use for their additional rolling stock, as they anticipated that their passengers for the current year would be considerably in excess of 50 millions. Their arrangements for through-running with the French company continued to work to the advantage of the two companies. Separate tickets were still issued on each company's lines, a system to which the French company wished to adhere. The French company was about to introduce through-running between the French 'Bus Co. and the Chinese company's lines to the terminal station of the Shanghai Hanghono Railway, and that might lead later on to an arrangement for through-running between all three companies, thus establishing a through-train service from that terminal to the Shanghai and Hanking Railway Station, which adjoined their system. The success of the tramway companies in Shanghai and elsewhere had led to enquiries by the Chinese authorities as to the possibility of starting tramways in some of their large townships, and their general manager had been in communication with some of them on the subject. It might be to their advantage to interest the company in business of that sort if obtainable on reasonable terms with adequate guarantees.

Mr. J. S. HASKELL seconded and the report was adopted.

Submarine Cables Trust, Ltd.

THE annual meeting was held on May 13th at Electra House, E.C., Sir J. DENISON-PENDER, K.C.M.G., presiding.

The CHAIRMAN, in moving the adoption of the report, said he had to refer with regret to the death of one of their trustees, Mr. Kenneth Anderson, who was appointed a trustee in 1892. He was the son of the late Sir James Anderson, who was so closely associated with and who did so much for submarine telegraphy, and his death caused the name of Anderson to fall out of the list of directors of the associated companies. Turning to the report, the Chairman said that the total receipts for the year amounted to £25,526, and after deducting the very small amount necessary for the working expenses of the Trust, £1,517, and adding £56 brought forward, they had an available balance of £24,065. Of that amount they had distributed £16,470 to the certificate-holders, being at the rate of 6 per cent. net in the form of the usual half-yearly coupon paid on the 15th October, 1913, and on the 15th April of this year. That left them with a surplus of £7,565 which, in accordance with the terms of the Trust deed, they had utilised in the acquisition of certificates. Those they had been able to buy on the market at prices somewhat under the stipulated figure of £120, exclusive of the coupon reversion, and accordingly in that way they had been able to purchase no fewer than 68 certificates during the year. That was the largest number ever acquired in any single year out of the surplus funds. Their receipts were slightly more than they were during the preceding year, whilst their expenses were about £200 less. It was impossible to make an exact comparison of the receipts with those of the previous year owing to the fact that certain changes had taken place in the capital investments. During the past year the trustees had again adopted the policy of making a redistribution of some of the investments of the Trust. They had sold a further £9,700 Anglo-American preferred stock and had re-invested part of the proceeds in shares of the Great Northern Telegraph Co. and the Mackay Companies, and the balance would be invested in due time in suitable securities as opportunity occurred. He might say that should the income of the Trust remain about the same as it was at the present time they would absorb either by purchase or drawing the last certificate in about 22 years' time, bringing the Trust automatically to an end in the year 1936, when the property would be sold and the proceeds distributed amongst the happy possessors of coupons of reversion which, at the present calculation, would represent about £170 per coupon. The number of certificates purchased in the market or drawn amounted now to 1,494 out of the original 4,200, leaving 2,706 still outstanding.

Sir LEPPOC CAPPEL seconded the resolution, which was unanimously agreed to.

Lisbon Electric Tramways, Ltd.

THE annual meeting was held on May 13th at the offices, 1, London Wall Buildings, E.C., Mr. LUDWIG BREITMEYER presiding.

In moving the adoption of the report (see ELEC. REV., page 833) the CHAIRMAN said that no untoward incidents had occurred in connection with the tramways during the year; the company had continued its efficient services without interruption, and the revenue showed an increase of about £40,000 over that of the previous twelve months. That surplus, however, had been absorbed by heavier expenditure, mainly brought about by higher wages and a rise in the cost of coal and other commodities, so that the net financial result was practically the same as in the previous year. The fall in the rate of exchange had reduced the profits by approximately £5,700. That was, of course, entirely beyond the control of the board and was due to the economic conditions which had prevailed during the year in Portugal. That fall in exchange hit them both ways—by increasing the cost of coal and other material which had to be bought in sterling value, imported from abroad into Portugal; whilst on the other hand it diminished the purchasing power of local currency for their remittances to London. The exchange had veered round about 45d. for some considerable time now, and they hoped it had found its level, but as a further precaution they had built up an exchange reserve account of £50,000 to safeguard them against any violent breaks. The depreciation on their investments had necessitated their writing down by £15,353 to bring them to the market value on December 31st last. That, however, need not necessarily be considered a permanent loss. The traffic figures were again a record and showed the continuous progress of the undertaking from year to year. The number of passengers carried was 58,840,923, against 50,411,963 in 1912, showing an increase of 8,428,960. The construction of the Ascensores line was now nearing completion. One of the lines had been actually in service for a few months, and when the remainder was finished it would consolidate the whole system and tend to increase its earning powers. The work of installing the additional unit in the power house was also nearly completed. For some time past they had been trying to get a satisfactory agreement with the Municipality of Lisbon in regard to the interpretation of some of the clauses of the concessions under which they were working the tramway business. Towards the end of the year they succeeded in bringing about a settlement equitable to both sides, and one which provided for the building of many new lines and which conceded considerable advantages to the municipality as well as to the public of Lisbon. Before its final ratification the agreement had to be submitted to the new municipality elected for the current year, and he regretted to say that that body could not see its way to endorse the action of its predecessors. The directors would continue their endeavours in this direction, as their only desire was to work in complete harmony with the municipality as they were doing with the Government of Portugal.

Mr. J. B. TAYLOR seconded the motion.

Replying to a shareholder, the CHAIRMAN said that the company's concession ran for 99 years from 1888, at which date the undertaking would revert to the municipality without payment.

The report was adopted.

Calcutta Electric Supply Corporation, Ltd.

THE directors' report for 1913 states that during the year 14,070,927 units were sold, compared with 12,043,398 units in 1912. The number of consumers connected is 7,597, an increase of 567.

Year.	Consumers.	Units sold.	Gross revenue.	Net revenue.
1910	5,695	8,940,005	£137,998	£85,597
1911	6,383	10,566,038	£151,905	£95,597
1912	7,030	12,043,398	£173,907	£110,168
1913	7,597	14,070,927	£188,767	£127,092

Exchange is calculated at 1s. 4d. per Rupee.

The profits for 1913 amount to £127,029, which, with the balance brought forward and interest received on money at deposit, makes a total of £130,321. After deducting the interim dividend of 3½ per cent., actual, paid on the ordinary shares in November, 1913; the dividends paid and accrued on the preference shares, and the other items set out in the net revenue account, there remains an available balance of £84,115. The directors recommend that £42,000 be placed to the credit of the depreciation and renewals account; that £5,000 be added to the reserve fund; and that a final dividend be paid on the ordinary shares for the second half year, at the rate of 5½ per cent., actual, making 9 per cent. for the year, which will leave £7,448 to be carried forward, after providing for the directors' extra remuneration of £2,500, and a bonus of £1,271 payable to the staff in India. The reserve for depreciation and renewals will thus be increased to £154,386, and the reserve fund, with the addition of £1,874 from dividends on investments, will stand at £97,963. The business has increased to such an extent that additional office accommodation has become necessary, both in Calcutta and in London. New offices have accordingly been taken, and are already occupied at Calcutta, and the company's head offices in London will be removed next month to 1, Broad Street Place, Finsbury Circus, E.C. The expenditure on capital account last year amounted to £70,148, the total outlay to December 31st last being £1,229,145. The demand for electrical energy in Calcutta continues to increase, a demand which must be met—and it is probable therefore that additional capital may have to be issued later. The board recommend that authority be given to the directors in accordance with a notice issued to the shareholders.

STATEMENT OF ELECTRICITY GENERATED, SOLD, &c.

Units generated	19,670,350
Units sold—Public lamps	47,078
By special contract	978,629
To consumers by meter for lighting	3,865,512
To consumers by meter for power	9,179,708
Total sold	14,070,927
Used on works	3,425,019
Not accounted for	2,174,406
Accounted for	17,695,946
KW. connected for public lamps	105
Maximum supply demanded in KW.	5,593

Continental.—Belgium.—As is fairly well known, Belgian companies have manifested considerable enterprise in the direction of creating and investing in electric tramways and supply works in different countries. Three of the principal trusts are the Société Générale de Chemins de Fer Economiques, the Société Générale Belge d'Enterprises Electriques and the Société Financière de Transports et d'Enterprises. These have a combined share capital of £2,260,000, which has a quotation value of over twice this amount, and bonds have also been issued to the extent of £1,200,000. Including the premiums realised on new issues of capital, it is calculated that about £4,000,000 is now invested by the three companies in tramways and supply works. The new Belgian company law has rendered it necessary for companies in general to prepare a list of the securities held in portfolio, and the three in question indicate, apart from various financial operations, a total combined investment of £2,600,000, which is distributed among 46 companies having an aggregate share capital of £28,000,000, and loan capital of £20,000,000. The countries covered by these undertakings include Belgium, France, Italy, Spain, Germany, Russia, Austria, China, Siam and South America, and the three trusts have been engaged in the business for a period of years dating onwards from 1886 for the first mentioned, 1895 for the second, and 1898 for the third.

The balance-sheet of the Bell Telephone Manufacturing Co., of Antwerp, for the last financial year shows a loss of £15,948.

North France Supply Co.—The report for 1913 of the Société l'Energie Electrique du Nord de la France states that the total production amounted to 54,656,300 kw.-hours, as compared with 40,506,800 kw.-hours in 1912. At the end of December the total plant at the Wasquehal station, which is situated in the vicinity of Roubaix, comprised 43,000 h.p., but since then a further unit of 9,000 h.p. has been brought into operation. During the year further contracts were concluded with many manufacturers in the district, and it had been necessary to order an additional turbo-generator set which will be ready at the end of 1914. The balance of gross profits amounts to £46,000, or £8,000 in excess of 1912. After making provision for renewal and redemption funds and making other allocations, the net profits are returned at £24,800, which sum has enabled the payment of a dividend of 6 per cent. on the ordinary share capital of £400,000, this rate comparing with 5½ per cent. in 1912.

The Russian A.E.G.—The report for 1913 of the Russian A.E.G. states that although political complications and the dearness of money caused disquietude, the economic development of the country continued also throughout the year. The electrical industry is deriving advantage from this state of affairs. The company's works were employed to the full extent of their capacity, and the orders now on hand exceed the value of the total turnover in 1913. As gross profits the accounts show the sum of £175,148, as compared with £129,561 in 1912. After providing for depreciation and reserve funds, the balance of net profits permits of the payment of a dividend of 9·4 per cent. on share capital of £1,200,000, as contrasted with 9 per cent. on £800,000 in the preceding year.

France.—Among the new companies recently formed in France are the Société Miniere et Electrometallurgie du Sud-Ouest, Paris (21, Rue du Treilhard), capital, £20,000, and the Société Electro-metallurgique de Montricher, Chambery, capital, £120,000. The object of the last-named concerns is to acquire and carry on the Rochette works at Argentine and Montricher (Savoy).

Doulton & Co., Ltd.—A dividend of 10 per cent. on the preference shares is announced, bringing the dividend up to December, 1911. £26,826 is carried forward.

West India and Panama Telegraph Co., Ltd.—The directors recommend the payment of dividends of 6s. per share on the first preference shares for six months to December 31st, and 6s. per share on the second preference shares for six months to December 31st; also 1s. per share on the ordinary shares.

STOCKS AND SHARES.

Tuesday Evening.

The Stock Exchange markets have taken on a better complexion for the time being. For this the chief reason must be sought in the idea that peace is coming in Mexico, as well as in Ulster. Mediatorial efforts in regard to the former are said to be meeting with a fair amount of success, and the strong recoveries which have occurred in Mexican Railway stocks led to revival in some of the utility issues. The pressing difficulties surrounding Ulster are, it is hoped, gradually yielding to commonsense, and only in the railway world is there marked unrest for the moment.

The charming suggestion that all railwaymen, whatever their grade, should be put upon a 48-hours' week and receive an immediate increase in their wages of 5s. per week, may attract the wistful envy of the average member of the Stock Exchange, but fails to inspire confidence in the stocks on the part of his client. Until Monday, the market had been making quiet progress towards recovery; but in the face of the five-shillings-a-week-rise suggestion, there came a general relapse, and fairly heavy falls took place in the prices of the steam stocks.

Undergrounds participated to a mild extent. On the week, Metropolitans are ⅝ lower; Districts lost ¼; Underground Electric Railways shares of both classes and the 6 per cent. Income bonds have given way. The last-named trio weakened on the reasonable hint thrown out by the Road Board that the omnibuses should contribute to the upkeep of the roads. This, if brought into operation, would certainly make a considerable difference to the profits of the Underground Electric group, unless fares were advanced. Besides this, there are, of course, the negotiations which have been in progress between the men and the company with reference to wages and hours, and these contributed to slight reductions in depressing quotations. The rest of the securities in this department are steady. District 4½ per cent. Preference eased off to 84½, but except for this there are no alterations worth mentioning.

London Electricity Supply descriptions are steady, but stagnant. St. James' rose to 9½, and County of London Preference followed up its improvement last week of half-a-crown with a similar gain; in fact, there have been buyers in the market of County Preference at $12\frac{1}{16}$. Holders of both classes of shares might notice that while the old can be sold about 12, they could be replaced by the new Preference at 11½ or less, and, allowing for the difference in the dividend payments, there is a decided turn in making the exchange. Chelseas are better at 4⅛; Charing Cross, City Preference and Edmundson's Preference gained ⅛ apiece, and for several shares, the official quotations for which have not been advanced, there are better buyers than sellers. Nothing further has transpired in the market as to new developments in connection with the recent holding scheme.

Reduction in the dividend on Reuters has come without much surprise to anybody. It was felt that the Company would have been better advised to have paid in 1912 the same rate which it has just declared for 1913—namely, 7 per cent.—instead of distributing 10 per cent. in respect of the former year. The reduction in the dividend brings down the yield with a run, but it is generally agreed that sound finance can have no quarrel with Reuters for paying the smaller amount. The report said that Reuters Bank, Ltd., is making satisfactory progress; incidentally, it may be noticed that the Bank brought out at the beginning of the week an issue of 6 per cent. Trust Certificates on behalf of the Federal Government of Mexico. Callenders, on the strength of a favourable meeting, rose to 12⅜, and Henleys have continued their rise, another 10s. improvement taking the price to 15 middle, which makes a gain of about 30s. since the beginning of the month.

Other Manufacturing things are good. British Westinghouse Preference have risen to 31s., so that apparently the statement quoted here last week, to the effect that the company is doing exceedingly well, has been sufficiently appreciated to bring in buyers. Electric Construction Ordinary and Preference shares have both improved by reason of the rise in the dividend on the former. Willans & Robinson Preference stock, quoted *ex* £4 dividend last Thursday, is nominally only 1 point lower. British Aluminium Ordinary have regained their slight loss of last week, and the Debenture stock is 2 points higher at 92½. Castner-Kellners are ½ better on the declaration of an interim dividend of 5 per cent. on old and new shares. Last year it was 9 per cent., on old shares only, so the present distribution is equal to an advance of 1 per cent.

The principal gain in the Mexican division is one of 6 in Mexico Tramways Common shares, while the Light and Power shares are 5 higher; the bonds of both companies are better. Advices by mail and cable continue to report the absence of damage to property owned by private undertakings, and, having regard to the immunity from harm which the prominent oil concerns—even at Tampico itself—have enjoyed, there is sound justification for the hope that the light and power companies will come off equally scatheless. It will be noticed, however, that prices go up and down to the extent of several points per week, from which it might be supposed that business is active, whereas, as a matter of fact, the opposite is the case—to such an extent that buying or selling of a mere handful of shares is sufficient to bring about fluctuations of several points. Brazil Tractions are 2 better, the market for these shares recovering much of its previous elasticity and buoyancy.

Rio Tramway Firsts are harder, but the Seconds went back a little. Para Electrics are steady, pending the announcement of what is expected to be a reduced dividend, and the rest of the issues in this market are firm. Calcutta Electric Preference have regained their slight loss of last week, but the Ordinary remain dull, notwithstanding the improvement in the dividend.

The resolutions for increasing the capital of the Brisbane Electric Tramways Investment Company were to be submitted at the meeting on Thursday in this week, the proposal being to create 30,000 new Ordinary shares of £5 each, to be offered at par to ordinary shareholders, and to rank in all respects *pari passu* with those at present existing. The Barcelona Traction, Light and Power Company is said to have a new issue of Preferred capital in contemplation, but it is expected that this will be offered in Brussels.

Apart from Cable shares, the list of Telegraph and Telephone descriptions shows comparatively few changes. West Coast of America fell another ⅛ in consequence of the passing of the dividend, and Marconis, after being 3⅛, reacted to 3⅛, the Preference shares also being easier at $2\frac{9}{16}$. Direct Spanish Telegraph Preference fell ¼. New York Telephone bonds have rallied to all but par. Chili Telephones fell $\frac{1}{16}$ to $7\frac{1}{16}$.

The Rubber share market, after making a brief demonstration of strength, subsided on somewhat poor results being obtained at the opening of the auction sales this week in Mincing Lane. Business is very quiet, and with the price of the raw produce tending to dwindle, there is little encouragement to offer prospective purchasers.

SHARE LIST OF ELECTRICAL COMPANIES.

ELECTRIC RAILWAYS AND TRAMWAYS.—HOME.

NAME.	Stock or Share.	Dividends for 1912.	Dividends for 1913.	Closing Quotations May 19th.	Rise + or Fall —	Present Yield p.c. £ s. d.
Bath Trams, Pref. Ord.	* 1	Nil	..	⅜ — ⅝	..	Nil
Do. 5 % Pref.	1	5	5	⅞ — 1	..	6 13 4
Do. 4½ % Deb.	100	4½	4½	70 — 75	..	6 0 0
Brit. Elec. Trac., 6 % Pref.	100	..	..	14½ — 16½	..	..
Do. Do. Deferred	100	..	..	5⅜ — 7⅜	..	..
Do. Do. 6 % Cum. Pr'f.	100	6	6	89½ — 91½	+ ½	6 11 2
Do. 7 % Non-Cum. Pr'f.	100	3	..	55 — 58	..	5 3 8
Do. 5 % Perp. Deb.	100	5	5	92½ — 94½	+ ½	5 6 0
Do. 4½ % 2nd Deb.	100	4½	4½	77 — 80 xd	..	5 12 9
Central London Railway, Ord.	100	8	8	57 — 62	..	4 16 9
Do. Gtd. Assented	100	..	4	82 — 84	..	4 15 3
Do. Pref.	100	4	4	68 — 73	..	5 9 7
Do. Gtd. Assented	100	..	4	83 — 85	..	4 14 8
Do. Def.	100	2	2	40 — 45	..	4 9 0
Do. Gtd. Assented	100	..	4	81 — 83	..	4 16 7
Do. 4 % Deb.	100	4	4	97 — 99	..	4 0 10
City & S. London, 6 % Pref., 1891	100	5	5	95 — 97	..	5 3 1
Do. Do. 1896	100	5	5	91 — 94	..	5 6 5
Do. Do. 1901	100	5	5	89 — 92	..	5 8 8
Do. Do. 1903	100	5	5	89 — 92	..	5 8 8
Do. 4 % Deb.	100	4	4	86 — 88 xd	..	4 11 0
Hastings Trams, 6 % Pref.	1	6	6†	⅛ — ⅜	+ ⅛	8 6 8
Do. 4½ % Deb.	100	4½	4½	65 — 70	..	6 8 7
Isle of Thanet Trams, 5 % Pref.	5	2½	3	2 — 2½	..	6 0 0
Do. 4 % Deb.	100	4	4	73 — 78	..	5 2 7
Lancashire United, 5 % Deb.	100	5	5	87 — 89	..	5 12 4
London and Suburban, Ord.	1	..	..	⅛ — ⅜	..	..
Do. Do. 5 % Cum. Pref.	1	..	5†	1⅛ — 1⅜	..	7 12 8
Do. Do. 4½ % 1st Deb.	100	4½	4½	78 — 83	..	5 8 5

NAME.	Stock or Share.	Dividends for 1912.	Dividends for 1913.	Closing Quotations May 19th.	Rise + or Fall —	Present Yield p.c. £ s. d.
London Elec. Railways, 4 % Deb.	* 100	4	4	90 — 92	..	4 7 0
London United Trams, 4 % Deb.	100	4	4	56 — 60	..	6 13 4
Metropolitan Railway Consol.	100	1⅝	1⅝	39½ — 40	— ¾	3 15 0
Do. Surplus Lands	100	2½	2½	62 — 64	..	4 6 0
Do. 3½ % Deb.	100	3½	3½	87 — 89	..	3 18 7
Do. 3½ % Pref.	100	3½	3½	82 — 84	..	4 3 4
Do. 3½ % Con. Pref.	100	3½	3½	80 — 82	..	4 5 4
Metropolitan District Ord.	100	Nil	..	26 — 26½	— ½	Nil
Do. 6 % Deb.	100	6	6	138 —141	..	4 5 3
Do. 4 % Deb.	100	4	4	92 — 94	..	4 5 1
Do. 4 % Prior Lien	100	4	4	95 — 97	..	4 2 6
Do. 4½ % First Pref.	100	4½	4½	83 — 86	—1	5 4 8
Do. 3½ % Gtd.	100	3½	3½	74 — 76	..	4 12 1
Metro. Elec. Trams, 4½ % Deb.	100	4½	4½	87 — 90	..	5 0 0
Do. 5 % Deb.	100	5	5	85½ — 88½	..	5 13 0
Potteries, Ord.	1	3¼	3½	⅝ — ¾	..	8 0 0
Do. 5 % Pref.	1	5	5	¾ — ⅞	..	7 12 8
Do. 4½ % Deb.	100	4½	4½	81½ — 84½ xd	..	5 6 2
South Metro. Trams, 4 % Deb.	100	4	4	66 — 70	..	5 14 4
Underground Elec. Railways	10	..	..	⅞ — 1⅛	— ⅛	Nil
Do. "A"	1/-	..	..	⅛ — ⅜	— ⅛	Nil
Do. 6 % First Cum. Inc. Deb.	100	6	6	115 —117	+1	5 2 7
Do. 4½ % Bonds	100	4½	4½	99½—101½	..	4 8 8
Do. 6 % Income	100	6	6	88½ — 89½	— ½	6 14 1
Yorkshire (West Riding), Ord.	5	Nil	..	⅝ — ¾	..	Nil
Do. 6 % Pref.	5	3	4	⅞ — 1⅛	..	4 2 8
Do. 4½ % Deb.	100	4½	4½	84 — 87	..	5 3 6

ELECTRIC RAILWAYS AND TRAMWAYS.—COLONIAL AND FOREIGN.

Anglo-Arg. Trams, 1st Pref.	5	5½	5½	4⅝ — 4⅞	..	5 12 10
Do. 2nd Pref.	5	5½	5½	4 15/16 — 4 15/16	..	6 4 0
Do. 4 % Deb.	100	4	4	92 — 94	..	4 5 1
Do. 4½ % Deb.	100	4½	4½	98½—101½	..	4 8 6
Do. 5 % Deb.	100	5	5	96½— 98½	..	5 1 6
Auckland Trams, 5 % Deb.	100	5	5	103 —106	..	4 14 3
Bombay Elec. S. & Trams, Pref.	10	6	6	10⅝— 11½	..	5 4 4
Do. 4½ % Deb.	100	4½	4½	94½— 96½	..	4 13 3
Do. 5 % 2nd Deb.	100	5	5	99 —101	..	4 19 0
Brazilian Traction, Light and Power	$100	6	6†	79½— 81½	+2	7 7 3
Brisbane Trams Invt., Ord.	5	8	8	7⅞ — 8	..	5 0 0
Do. 5 % Pref.	5	5	5	4⅞ — 5⅛	..	4 13 0
Do. 4½ % Deb.	100	4½	4½	98 —101	..	4 9 1
B. Columbia Elec. Rly., Def.	100	8	8†	111 —115	..	6 19 4
Do. Pref. Ord.	100	6	6	104 —108	..	5 11 1
Do. 5 % Pref.	100	5	5	103 —105	..	4 15 2
Do. 4½ % 1st Mort. Deb.	40	4½	4½	96 — 99	..	4 11 1
Do. 4½ % Vancouver Deb.	100	4½	4½	94 — 98	..	4 12 0
Do. 4½ % Con. Deb.	100	4½	4½	93½— 95½	..	4 9 1
Calcutta Trams, Ord.	5	7½	9½	6⅝ — 7	..	6 15 9
Do. 5 % Pref.	5	5	5	5 5/16 — 5 5/16	+1/16	4 14 3
Do. 4½ % Deb.	100	4½	4½	97 — 100	..	4 10 0
Cape Electric Trams	1	5	5	⅜ — ½	..	6 13 4
City Buenos Aires Trams (1904)	5	5	5	5 5/16 — 5 5/16 xd	..	4 11 11
Do. 4 % Deb.	100	4	4	94 — 97	+1	4 2 6
Colombo Elec. Tr. & Lt., 5 % Deb.	100	5	5	88 — 92	..	5 8 8
Havana Elec. Rly., 5 % Bonds	$1000	5	5	93½— 97½	..	5 2 6
Kalgoorlie El. Trams 5% A Deb.	100	5	5	84 — 89	..	5 12 4
Do. 6% B Deb.	100	3	..	10 — 20	..	Nil

La Plata Elec. Trams, Ord.	1	..	..	⅛ — ⅜	..	..
Do. Pref.	1	4½d.	6	⅝ — ¾ xd	..	6 5 0
Lisbon Elec. Trams, Ord.	1	6	6	1⅜ — 1½ xd	..	4 9 3
Do. 6 % Pref.	1	6	6	1⅝ — 1⅞	..	5 1 0
Do. 5 % Deb.	100	5	5	95 —100	..	5 0 0
Madras Elec. Tr., 6% Cum. Pref.	5	6	6	4⅞ — 5½	..	5 14 3
" Elec. Tr. (1904), Deb.	100	5	5	101 —103	..	4 17 0
Manaos Trams & Lt., 1st Deb.	100	5	5	78 — 81	..	6 3 5
Manila Elec. R. and Ltg., Bonds	$1000	5	5	98½—100½	..	4 19 6
Mexico Trams Con	$100	7	7	67 — 71	+6	..
Do. Gen. Con. 5 % Bonds	..	5	5	77 — 81	+1	6 3 5
Do. 6 % Bonds	100	6	6	74 — 79	+2	7 11 10
Para Elec. Rlys. & Lt., Ord.	5	10	10	3⅞ — 4⅛	..	11 8 6
Do. 6 % Pref.	5	6	6	4 — 4½	..	6 13 4
Do. 5 % 1st Deb.	100	5	5	86½— 89½ xd	..	5 11 8
Rangoon El. Tr. & Sup., Pref.	5	6	6	5 — 5½	..	5 9 1
Do. 4½ % 1st Deb.	100	4½	4½	95 — 97	..	4 12 9
Rio de Janeiro Trams, 1st Mort. 5 % Bonds	..	5	5	95½— 97½	+1	5 2 8
Do. 5 % Mort. Bonds	100	5	5	87½— 89½	— ½	5 11 9
Sao Paulo Tram., Lt. and P. 5 % 1st Deb.	$500	5	5	96 —100	..	5 0 0
Singapore Trams, 5 % Deb.	100	5	5	88 — 92	..	5 8 8
Southern El. Tr. B.A., 5 % Deb.	100	5	5	95 — 97	..	5 3 0
Un. Elec. Trams Monte Video	5	7	7	4⅜ — 5⅛	..	6 16 7
Do. 6 % Pref.	5	6	6	4⅞ — 5⅛	..	5 14 3
Do. 5 % 1st Deb.	100	5	5	92½— 95½	..	5 4 9
Winnipeg Elec. Rly., 4½ % Deb.	100	4½	4½	93½— 95½	..	4 14 3

ELECTRICITY SUPPLY AND POWER COMPANIES.—HOME.

Bournemouth & Poole, Ord.	10	6	7	10 — 11	..	6 7 4
Do. 4½ % Pref.	10	4½	4½	9 — 10	..	4 10 0
Do. Second 6 % Pref.	10	6	6	10⅝ — 11⅞	..	5 10 4
Do. 4½ % Deb. Stock	Stock	4½	4½	95 — 98	..	4 11 9
Brompton & Kensington, Ord.	5	10	10	8⅞ — 9⅛	..	5 8 1
Do. 7 % Cum. Pref.	5	7	7	8⅛ — 8⅜	..	4 0 0
Central Electric Supply, 4 % Guar. Deb.	100	4	4	91½ — 94½	..	4 4 8
Charing Cross, West End & City	5	5	6	4⅞ — 5⅛	..	5 11 7
Do. 4½ % Cum. Pref.	5	4½	4½	4⅝ — 5	..	4 10 0
Do. "City Undertaking" 4½ % Cum. Pref.	5	4½	4½	4½ — 4⅝	+ ⅛	4 17 4
Do. Do. 4 % Deb.	100	4	4	92 — 94	..	4 5 1
Chelsea, Ord.	5	5	5	4⅝ — 5⅛	+ ⅛	4 17 7
Do. 4½ % Deb.	Stock	4½	4½	97 —100	..	4 10 0
City of London, Ord.	10	9	10	16 — 17	..	5 17 8
Do. 6 % Cum. Pref.	10	6	6	12½ — 13½	..	4 9 0
Do. 5 % Deb.	Stock	5	5	116 —120	..	4 7 4
Do. 4½ % Second Deb.	100	4½	4½	100 —103	..	4 8 1
County of London, Ord.	10	6	7	11⅛ — 12⅜	..	5 14 3
Do. 6 % Pref.	10	6	6	11⅞ — 12⅜	+ ⅛	4 17 0
Do. 4½ % Deb.	Stock	4½	4½	103 —106	..	4 5 3
Do. 4½ % Second Deb.	Stock	4½	4½	98 —101	..	4 9 1
Edmundson's, Ord.	£8	..	..	⅝ — ⅞	..	Nil
Do. 6 % Cum. Pref.	5	6	6	3¾ — 4	— ⅛	7 10 0
Do. 6 % Non-Cum. Pref.	5	..	..	1⅝ — 2	..	..
Do. 4½ % First Mort. Deb.	100	4½	4½	84 — 87	..	5 3 6
Folkestone	5	6	6	5 — 5½	..	5 9 1
Do. 4½ % First Deb.	100	4½	4½	93 — 95	..	4 14 9

Hove	5	8	9	8½ — 9	..	5 0 0
Kensington & Knightsbridge, Ord.	5	8	9	7⅞ — 8	..	5 12 0
Do. 4 % Deb.	Stock	4	4	90 — 92	..	4 7 0
Kent Elec. Power, 4½ % Deb.	Stock	4½	4½	76 — 80	..	5 12 0
London Electric, Ord.	3	2½	3	1⅜ — 1½	..	5 2 7
Do. 6 % Pref.	5	6	6	4⅜ — 5½	..	5 14 8
Do. 4 % First Mort. Deb.	Stock	4	4	92½ — 96½	+ ½	4 3 9
Metropolitan	5	4½	4½	3½ — 3⅝	..	6 0 0
Do. 4½ % Cum. Pref.	5	4½	4½	4⅝ — 5	..	4 10 0
Do. 4½ % First Mort. Deb.	Stock	4½	4½	97 —100	..	4 10 0
Do. 3½ % Mort. Deb.	Stock	3½	3½	83 — 86	..	4 1 4
North Metropolitan Power Supply, 5 % Mortgages (Red.)	100	5	5	98 —101	..	4 19 1
Notting Hill, 6 % Non-Cum. Pref.	10	6	6	9⅜ — 10½	..	5 14 3
Oxford	5	7	7	5⅛ — 6⅜	..	5 11 0
St. James' and Pall Mall, Ord.	5	10	12	9½ — 9⅝	+ ⅛	6 3 1
Do. 7 % Pref.	5	7	7	6⅞ — 7⅛	..	4 16 7
Do. 3½ % Deb.	100	3½	3½	83 — 86	..	4 1 4
South London, Ord.	4	5½	5½	2⅜ — 3¼	..	6 10 4
Do. 5 % First Mort. Deb.	100	5	5	99 —102	..	4 18 0
South Metropolitan, 7 % Pref.	1	7	7	1⅜ — 1⅝	..	5 6 8
Do. 4½ % First Deb. Stock	100	4½	4½	97 — 100	..	4 10 9
Urban, Ord.	£8	Nil	..	⅝ — ⅞	..	..
Do. 5 % Cum Pref.	5	3½	4	2¾ — 3	..	6 13 4
Do. 4½ % First Mort. Deb.	100	4½	4½	84 — 87	..	5 13 6
Westminster, Ord.	5	10	10	8½ — 8⅝	..	5 14 3
Do. 4½ % Cum Pref.	5	4½	4½	4 15/16 — 5 1/16	..	4 6 9

* Unless otherwise stated, all shares are fully paid. † Interim Dividend. ‡ And Funded Certs.

Continued on next page.

SHARE LIST OF ELECTRICAL COMPANIES.—*(Continued.)*

ELECTRICITY SUPPLY AND POWER—COLONIAL AND FOREIGN.

NAME.	Stock or Share.	Dividends for		Closing Quotations May 19th.	Rise + or Fall —	Present Yield p.c.
Adelaide, 6 % Pref.	£5	6	6	5¼ — 5⅝	..	£ s. d. 5 11 7
Calcutta, Ord.	£5	8½	9	7⅜ — 7⅝	..	5 14 8
Do. 5 % Pref.	£5	5	5	4 15/16 — 5 1/16	+1/16	4 16 7
Calgary Power, 1st Mort. Bds.	100	5	5	90½ — 92½	..	5 8 0
Canadian Gen. El. Com.	$100	7	8	105 —110	..	7 5 6
Do. 7 % Pref.	$100	7	7	117 —122	..	5 13 10
Cordoba Lt., Power and T., Ord.	1	5	..	7/16 — 5/8	..	7 12 0
Do. 5 % Deb.	100	5	5	87 — 90	..	5 11 1
Elec. Lt. and P. of Cochabamba, 6 % Bonds	100	6	6	83 — 88	—1	6 16 4
Elec. Supply Victoria, 5 % 1st Mort. Deb.	100	5	5	91 — 94	..	5 6 5
Elec. Dev. Ontario, 5 % 1st Mort. Bonds	$500	5	5	93½—95½	..	5 4 9
Kalgoorlie Elec. P. and L., Ord.	10/-	Nil	..	1/32 — 3/32	..	Nil
Do. 6 % Pref.	£1	6	4	1/2 — 3/4	..	8 0 0
Kaministiquia Power, 5 % G. Bs.	$500	5	5	103 —105	..	4 15 2
Madras, Ord.	£5	Nil	..	1½ — 1¾	..	..
Melbourne, 5 % 1st Mort. Deb.	100	5	5	104 —107	..	4 13 6
Mexican El. Lt., 5 % 1st M. Bds.	..	5	5	58 — 63	..	7 18 10
Mexican Lt. & Power, Common	$100	4	4†	37 — 42	+5	..
Do. 7 % Cum. Pref.	$100	7	7	68 — 73	+1	9 11 5
Do. 5 % 1st Mort. Gold Bds.	..	5	5	68 — 73	—1	6 17 0
Do. 5 % 2nd Mort. Bonds	100	5	5	59 — 64	—1	7 13 3
Monterey Rly., Light & Power, 5 % 1st Mort. Deb.	* 100	1912. 5	1913. 5	50 — 54	..	£ s. d. ..
Montreal, Lt., H. and Power	$100	9	10†	220 —225 xd	..	4 9 0
Northern, Lt., Power and Coal, 5 % 1st Mort. Bonds	$500	5a	5a	10 — 20	..	..
River Plate, Ord.	Stock	10	10	235 —245 xd	..	4 1 8
Do. 6 % Non-Cum. Pref.	Do.	6	6	97 —103 xd	..	5 16 6
Do. 6 % Deb. Stock	Do.	5	5	101 —103	..	4 17 0
Roy. Elec. Co., Montreal, 4½ % 1st Mort. Deb.	100	4½	4½	100 —102	..	4 8 8
Shawinigan Water, Capital	$100	5½	6	134 —138	+1	4 7 0
Do. 5 % Con. 1st Mort. Bonds	$500	5	5	107 —109	..	4 11 7
Do. 4½ % Per. Deb.	Stock	4½	4½	99⅛ - 101⅛ xd	..	4 8 8
Toronto Power, 4½ % 1st Deb.	Do.	4½	4½	98 —100 xd	..	4 10 0
Vera Cruz Lt., P. and T., 5 % 1st Mort. Deb.	100	5	5	86 — 88	—1	5 13 8
Victoria Falls Power, Pref.	1	6	6	33/32 — 35/32	..	7 13 4
West Kootenay Power and Lt., 1st Mort. 6 % Gold	100	6	6	103 — 105	+1	5 14 3

MANUFACTURING COMPANIES.

NAME.	Stock or Share.	Dividends for		Closing Quotations May 19th.	Rise + or Fall —	Present Yield p.c.
Aron, Ord.	£1	7	..	33/32 — 37/32	..	£ s. d. 8 5 0
Do. 6 % Pref.	£1	6	6	1 — 1	..	6 17 2
Babcock & Wilcox	£1	16	16	2 15/16 — 3 1/16	..	5 4 7
Do. Pref.	£1	6	6	1½ — 1⅝	..	4 7 6
British Aluminium, Ord.	£1	..	5	1 1/16 — 1 1/8	+1/32	4 14 1
Do. 6 % Cum. Pref.	£1	6	6	1 1/16 — 1 1/8	..	6 8 0
Do. 5 % Prior Liens Debs.	100	5	5	97 —100	..	5 0 0
Do. Deb. Stk.	100	5	5	90 — 95	+2	5 5 3
B.I. & Helsby Cables	£5	10	13	9½ — 9⅝	..	6 18 4
Do. Pref.	£5	6	6	5¾ — 6⅛	..	4 14 1
Do. Deb.	100	4½	4½	101 —104	..	4 6 9
British Thomson-Houston, Deb.	100	4½	4½	92 — 94	..	4 15 9
British Westinghouse, Pref.	£2	Nil	5	1 7/16 — 1 5/8	+ 1/8	6 3 0
Do. Deb.	100	4	4	73 — 75	..	5 6 8
Do. 6 % Prior Lien	100	6	6	100 —103	..	5 16 6
Browett, Lindley, Ord.	£1	..	..	2/- —3/-	..	Nil
Do. Pref.	£1	..	..	8/- —8/6	..	Nil
Brush, 7 % Pref.	£2	Nil	..	0 — ½	..	Nil
Do. 5 % Prior Lien Deb.	100	5	5	80 — 85	..	5 17 8
Lo 4½ % Deb.	100	4½	4½	49 — 53	..	8 10 0
Do. 4½ % Second Deb.	100	4½	4½	29 — 33	..	13 12 8
Callender's Cable	£5	15	15	11⅞ — 15⅝	+ ⅛	5 18 7
Do. Pref.	£5	5	5	5 — 5½	..	4 16 5
Do. Deb.	100	4½	4½	97 —100	..	4 10 0
Castner-Kellner	£1	20	22½	2 3/16 — 2 1/8	+1/32	8 0 0
Do. Deb.	100	4½	4½	104 —107	..	4 4 1
Crompton & Co., Deb.	100	5	5	83 — 85	..	5 17
Dick, Kerr	£1	Nil	..	3/32 — 5/32	..	..
Do. Pref.	£1	6	6	3/16 — 5/32	..	7 13
Edison & Swan, A, £2 paid	£5	Nil	..	0 — 1/8	..	Nil
Do. fully paid	£5	Nil	..	1 — 1⅛	..	Nil
Do. 4 % Deb.	100	4	4	58 — 62	..	6 9 1
Do. 5 % Second Deb.	100	5	5	61 — 66	..	7 11 6
Electric Construction	£1	5	6	2/32 — 3/32	+3/32	8 0 0
Do. Pref.	£1	7	7	1 — 1⅛	+1/16	6 4 5
Greenwood & Batley, Pref.	£10	7	7	6¾ — 7¼	..	9 13 2
Do. Deb.	100	5	5	92 — 94	..	5 6 5
General Electric, 6 % Pref.	£10	6	6	10¼ — 10⅝	..	5 14 3
Do. Deb.	100	4	4	87 — 91	..	4 8 0
Henley's, Ord.	£5	15	20	14¼ — 15½	+ ½	6 9 0
Do. Pref.	£5	4½	4½	4⅞ — 5⅛	..	4 7 10
Do. Deb.	100	4½	4½	101½—103½	..	4 7 0
India-Rubber, G. & T.	£10	7½	7½	10 — 11	..	6 16 5
Do. Pref.	£10	5	5	8⅞ — 9½	..	5 5 3
Telegraph Construction	£12	20	20	36½ — 38½	..	6 4 7
Do. Deb.	100	4	4	98 —100	..	4 0 0
Willans & Robinson, 4 % 1st Mort. Deb.	100	4	..	64 — 68	..	5 17 8
Do. B 4 % Cum. Pref.	100	..	£4	42 — 46 xd	—1	8 14 0

TELEGRAPH AND TELEPHONE COMPANIES.

NAME.	Stock or Share.	Dividends for		Closing Quotations May 19th.	Rise + or Fall —	Present Yield p.c.
Amazon Telegraph	£10	4½	4½	5⅜ — 6½	..	£ s. d. 7 4 0
Do. 5 % Deb. Red.	Stock	5	5	94 — 97	..	5 3 0
American Telep. & Teleg., Cap.	$100	8	8	123 —127	+1	6 6 0
Do. Collat. Trust	$1000	4	4	90 — 93	..	4 6 0
Anglo-American Telegraph	Stock	8	8	84 — 87	..	4 9 7
Do. 6 % Pref.	Do.	6	6	108½—109½	+ ½	5 10 1
Do. Def.	Do.	30/-	30/-	28½ — 28⅝	..	6 7 0
Anglo-Portuguese Tel., 5 % Mort. Deb.	100	5	5	102 —104	..	4 16 2
Chili Telephone	£5	8	6†	7 3/16 — 7 7/16	—1/16	5 7 5
Commercial Cable, Stlg. 4 % Deb.	Stock	4	4	78 — 80	—1	5 0 0
Cuba Telegraph	£10	6	6†	8½ — 9½ xd	..	6 6 4
Do. 10 % Pref.	£10	10	10	16 — 17 xd	+ ½	5 17 8
Direct Spanish Telegraph, Ord.	£5	4	4	3½ — 4	..	5 0 0
Do. 10 % Cum. Pref.	£5	10	10	7½ — 7⅞	— ⅛	6 9 0
Direct United States Cable	£10	4	4	6½ — 7	..	5 14 4
Direct W. India Cable, 4½ % Reg. Deb.	100	4½	4½	98 —100	+1	4 10 0
Eastern Telegraph, Ord. Stock	Stock	7	7	180 —183 xd	..	5 5 3
Do. 3½ % Pref. Stock	Do.	3½	3½	77 — 79 xd	..	4 8 9
Do. 4 % Mort. Deb.	Do.	4	4	94 — 96	..	4 3 4
Eastern Extension	£10	7	7	12½ — 13 xd	..	5 7 9
Do. 4 % Deb.	Stock	4	4	94½ — 96½	..	4 3 0
Globe Telegraph and Trust	£10	6	6†	10⅝ — 11⅝	..	5 5 4
Do. 6 % Pref.	£10	6	6	12½ — 13	..	4 12 4
Great Northern Telegraph	£10	20	20	31 — 33	..	6 1 1
Indo-European Telegraph	£5	13	13	56½ — 58½	..	5 11 1
Mackay Companies Common	$100	5	5	81 — 84	..	5 19 1
Do. 4 % Cum. Pref.	$100	4	4	68 — 71	..	5 12 7
Marconi's Wireless Telegraph	£1	20	20	3 1/16 — 3 3/16	—1/32	6 6 6
Do. 7 % Cum. Partic. Pref.	£1	17	..	2 1/16 — 2 1/8	—1/16	6 6 6
Monte Video Telephone, Ord.	£1	6	6	4⅛ — 4⅜	..	6 8 0
Do. 5 % Pref.	£1	5	5	3⅜ — 3⅝	..	5 18 6
New York Telep., 4½ % Gen. Bnds.	100	4½	4½	99 —100	+ ½	4 10 0
Oriental Telep. and Elec.	£1	10	10	2 1/16 — 2 1/8	..	4 6 7
Do. 6 % Cum. Pref.	£1	6	6	1 3/16 — 1 5/16	..	4 13 5
Do. 4 % Red. Deb.	Stock	4	4	87½ — 89½	..	4 9 5
Pacific and European Tel., 4 % Guar. Debs.	Do.	4	4	98 —100	..	4 0 0
Reuter's	£10	10	7	8¾ — 9½	..	7 7 4
Submarine Cables Trust	Cert.	6	6	126 —129	+ 1	4 13 0
Telephone Co. of Egypt, 4½ % Deb. Red.	Stock	4½	4½	98 —100	..	4 10 0
United River Plate Telephone	£5	8	6†	6½ — 6⅞ xd	+ ⅛	5 18 5
Do. 5 % Cum. Pref.	£5	5	5	5⅛ — 5⅝	..	4 9 0
West Coast of America	£5	2½	Nil	⅞ — 1⅛	— ⅛	Nil
Do. 4 % Debs., 1 to 1,500 guar. by Braz. Sub. Tel.	100	4	4	96 — 99	..	4 0 10
West India and Panama Teleg.	£10	1½	1½	2⅛ — 2⅜	..	5 5 3
Do. 6 % Cum. 1st Pref.	£10	6	6	9⅝ — 10⅛	..	5 18 5
Do. 6 % Cum. 2nd Pref	£10	6	6	8⅝ — 9⅛	..	6 11 6
Do. 5 % Debs.	100	5	5	97 — 99	..	5 1 0
Western Telegraph, Ltd.	£10	7	7	13⅜ - 13⅞	..	5 1 11
Do. 4 % Debs.	Stock	4	4	95½ - 97½	..	4 2 1
Western Union 4½ % Fdg. Bonds	$1000	4½	4½	93 — 96	..	4 13 9

* Unless otherwise stated all shares are fully paid. † Interim dividend. a Paid in deferred interest warrants.

Bank rate of Discount 3 per cent., January 29th, 1914.

Lightning Damage at Cape Town.—Our Cape correspondent states:—"A severe thunderstorm broke over the Cape Peninsula recently, and did a considerable amount of damage to electric lighting installations. Unlike the districts further north, the thunderstorms in the Cape Peninsula are usually of such a feeble character that no special precautions have been taken against lightning discharges damaging house installations by means of the overhead wires. During the storm in question, however, in many instances the lightning entered the houses and blew the distributing fuseboards to atoms; the house of the Mayor of Greater Cape Town was damaged in this way."

Fire on the Rand.—Our Cape correspondent writes to state that "a fire broke out on May 1st in the Victoria Falls power station near the Robinson Mine. In some manner unexplained the transformers caught alight, and being filled with oil, there was a dangerous flame within a few minutes, jeopardising the main buildings, which are three storeys high. The manager of the adjoining mine assisted the brigade in the water supply, and after strenuous efforts the firemen were successful in overcoming the fire. The damage is estimated at £3,000."

EXPORTS AND IMPORTS OF ELECTRICAL GOODS DURING APRIL, 1914.

THE April returns of electrical export and import business, which we publish herewith, are only satisfactory in that they do not reflect to any great extent the general reports of declining trade.

These returns show some falling off all round as compared with the March figures, but are at a higher level than in February, and include the Easter period.

The exports reached a total value of £485,534, as compared with £498,145 recorded for March, and deducting the value of the telegraphic business, some £77,000 for the month, the value of the remaining general business was appreciably below the monthly average obtaining last year.

The imports, on the other hand, with a total of £273,205, which compares badly with the previous month's £292,559, were still considerably ahead of the monthly average (£245,000) in 1913.

The re-exports total of £22,190 is the lowest so far recorded this year, and compares with £24,810 in March.

The only satisfactory sections of the export returns were cables, batteries and telegraphic material, and the falling off in electrical machinery exports accounts largely for the poor month's returns.

Machinery imports, however, were somewhat higher than in the previous month, the greatest drop in the imports occurring in telegraphic and telephonic business.

The Indian market still remains an excellent one for British products, while it is noticeable that United States importers increased their electrical business with us by some £24,000 on the month.

Registered Exports of British and Irish Electrical Goods from the United Kingdom.

Destination of exports and country consigning imports.	Electrical goods and appliances.	Wires and cables rubber and other insulations.	Electric lighting fittings and accessories.	Electric glow lamps.	Electric arc lamps and lamp parts.	Electric meters and instruments.	Electric machinery.	Electrically-driven machinery.	Batteries and accumulators.	Carbons.	Telephonic cable and apparatus and electric bells.	Telegraphic cable and apparatus.	Total.
	£	£	£	£	£	£	£	£	£	£	£	£	£
Russia, Sweden, Norway and Denmark ...	1,714	425	...	130	1,599	347	7,754	116	80	67	131	2,195	14,558
Germany	4,403	1,580	41	...	296	8	2,035	...	15	96	60	590	9,124
Netherlands, Java and Dutch Indies ...	834	788	324	...	21	126	2,330	135	47	51	4	253	4,913
Belgium	726	211	194	31	52	25	3,222	437	18	...	1,410	...	6,326
France	548	31	2,364	42	...	7	9,976	66	95	80	125	1,167	14,501
Portugal	50	10	12	28	...	...	107	2,430	...	...	478	462	3,577
Spain, Canary Isles and Spanish N. Africa...	1,104	63	68	10	...	245	3,884	...	...	232	275	241	6,122
Switzerland, Italy and Austria-Hungary ...	1,678	93	141	...	13	22	3,616	...	129	611	166	487	6,956
Greece, Roumania Turkey and Bulgaria ...	358	451	96	...	...	...	187	...	9	12	...	1,851	2,964
Channel Isles, Gibraltar, Malta and Cyprus...	84	220	136	112	39	127	445	...	...	...	99	108	1,370
U.S.A., Philippines and Cuba	302	9,447	...	15	...	138	648	5	96	...	134	939	11,724
Canada and Newfoundland	971	343	1,700	644	49	417	6,088	...	258	31	555	1,009	12,065
British West Indies and British Guiana ...	315	...	30	25	...	200	137	...	...	...	2	119	828
Mexico and Central America	34	...	...	18	...	...	47	...	9	...	84	9	201
Peru and Uruguay	214	...	71	76	...	...	1,025	...	20	6	2	147	1,561
Chile	870	277	53	215	18	...	2,926	...	13	...	31	...	4,403
Brazil	1,740	313	531	40	...	1,218	9,210	5,191	223	29	21	2,230	20,746
Argentina	5,967	7,273	649	1,214	1,328	704	13,647	13	1,057	51	516	1,612	34,031
Colombia, Venezuela, Ecuador and Bolivia...	1,042	345	284	...	...	...	1,019	...	...	...	5	328	3,023
Egypt, Tunis and Morocco	476	36	87	106	...	18	2,064	10	825	...	275	1,426	5,323
British West Africa	180	217	14	66	...	932	194	...	164	...	21	8,769	10,557
Rhodesia, O.R.C. and Transvaal	1,679	2,757	78	654	44	69	2,069	2,015	313	46	51	53	9,828
Cape of Good Hope	1,187	1,944	447	462	35	479	5,755	...	165	...	1,867	1,210	13,551
Natal	1,199	5,813	147	174	212	...	9,437	397	565	17	1,397	1,150	20,508
Zanzibar, Brit. E. Africa, Mauritius & Aden	949	246	233	63	...	26	361	5	2	...	865	437	3,187
Azores, Madeira and Portuguese Africa ...	241	774	111	251	...	45	300	...	...	...	42	357	2,121
French African Colonies and Madagascar...	...	...	...	18	...	...	122	...	...	...	...	4,634	4,774
China and Siam	1,002	13,060	125	...	...	312	3,659	63	154	149	61	485	19,070
Japan and Korea	266	178	29	68	...	270	11,176	...	2,614	45	18	31,844	46,508
India	4,841	17,822	3,522	1,970	461	1,486	28,541	2,713	7,035	525	569	6,330	75,915
Ceylon	445	172	235	...	...	...	396	12	76	...	205	...	1,541
Straits Settlements, Fed. Malay States and Sarawak	1,463	996	592	87	78	164	4,468	461	359	98	215	866	9,847
Hong Kong	415	96	234	...	11	299	27	822	1,225	38	14	376	3,557
West Australia	1,345	1,249	4	244	...	20	1,293	1,545	211	16	12	...	5,939
South Australia	176	514	91	533	...	526	2,139	...	130	...	54	212	4,375
Victoria	356	4,575	661	965	311	1,229	6,077	233	345	...	19	774	15,545
New South Wales	1,921	2,532	483	915	773	1,606	21,409	734	...	147	3,402	3,026	36,948
Queensland	209	1,512	66	292	68	264	1,766	...	105	...	1,484	1,877	7,643
Tasmania	31	196	...	...	...	...	186	...	...	...	154	...	567
New Zealand and Fiji Islands	1,262	2,701	1,244	1,166	52	141	16,539	1,250	985	10	3,887	...	29,237
Total, £	42,597	79,260	15,097	10,634	5,460	11,470	186,281	18,653	17,342	2,357	18,710	77,573	485,534

Registered Imports into the United Kingdom of Electrical Goods from all Countries.

Russia, Norway, Sweden and Denmark ...	581	...	...	135	...	...	4,123	...	1,099	60	6,611	12,609
Germany	4,678	22,942	2,705	9,239	6,023	2,483	91,835	2,117	3,205	8,052	6,542	159,821
Holland	...	104	...	209	617	...	7	...	13	220	...	1,170
Belgium	898	2,314	...	131	7	...	4,245	...	180	873	3,354	12,002
France	...	680	1,493	1,837	212	26	1,246	...	1,436	3,361	905	11,196
Switzerland	211	383	...	26	44	612	947	8	...	82	81	2,394
Italy	55	6,514	...	...	45	...	207	...	...	218	323	7,362
Austria-Hungary	24	770	...	339	20	...	16	...	215	53	...	1,437
United States	10,194	34	2,124	34	672	80	17,407	26,460	984	305	6,227	64,521
Total, £	16,641	33,741	6,322	11,950	7,640	3,201	120,033	28,585	7,132	13,224	24,043	272,512

Additional imports: Spain, carbons, £410. Canada, electrical goods, £113; machinery, £170.

Registered Re-Exports of Foreign and Colonial Electrical Goods from the United Kingdom.

Various countries, mainly as above... ...	12,864	886	...	829	451	...	5,215	...	604	1,277	64	22,190

TOTAL EXPORTS: £485,534 TOTAL RE-EXPORTS: £22,190 TOTAL IMPORTS: £273,205

NOTE.—The amounts appearing under the several headings are classified according to the Customs returns. The first and third column contains many amounts relating to "goods" otherwise unclassified, the latter, doubtless, consisting of similar materials to those appearing in adjacent columns. Imports are credited to the country whence consigned, which is not necessarily the country of origin.

FINLAND AND ITS WATER POWER.

FINLAND has an area of 373,604 sq. km., and a population of 3 millions. About 41,659 km.^{2}, or 11 per cent. of the total area, is occupied by lakes, and the number of these is so immense that the country in poetry is called "the land of the 1,000 lakes." In the central and southern parts the number of lakes is greatest, and through the south-western part the River Kumo flows into the Gulf of Bothnia. During the dry season the flow of water in this river is about 160 cb. m. per second, which goes up to 570 m.^{3} per second at the high-water mark. In the north there is the large lake Näsijaroi, which has a length of 100 km. At the place where the rivers from this and another lake come together, they form the Tammerfors waterfalls, which have a height of 18 m., and a flow at low-water mark of 63, and at high-water mark of 164 m.^{3} of water per second. Here is situated the town of Tammerfors, which has a population of 43,700, and is one of the industrial centres of Finland.

In the southern part of the country is the Paijänne Lake, which has a length of 250 km., and from which runs the River Kymmene with a flow of 180—300 and 400 m.^{3} per sec. at low, middle, and high-water mark. This river forms along its course a number of waterfalls and rapids, of which the most important are :—

	Height of the fall.	*Available E.H.P.*
Voikka	6·60 m.	9,240
Kuusaukoski	9·50 „	13,300
Myllikoski	7·80 „	10,900
Keltis	5·10 „	7,140

In the south-eastern corner is the Saimaisjö, a lake with a number of branches. From this flows the Vuoxen river, which is about 148 km. long and runs with considerable speed into the sea of Ladoga, in Russia. The flow of water is 480, 570 and 660 m.^{3} per sec. In its upper course there are 13 waterfalls on the short distance of 25 km., viz. :—

	Width. Metres.	Height of the fall. Metres.	Capacity, E.H.P. Greatest.	Smallest.
Niskaskoski ...	190	1·60	17,000	8,500
Tainionkoski ...	70	5·9	44,000	31,000
Linnakoski ...	170	5	37,000	26,000
Imatra	20	18·3	138,000	98,000
Kyyronkoski, Myllikoski, Vallinkoski	115	10·4	78,000	55,000
Räikköläukoski ...	45	8·8	66,000	46,500
Rouhialoukoski ...	60	7·5	56,000	39,500

The remaining four have not been measured as yet.

Most of the rivers in the central part of the country are running into the Saimasjö, and by regulation it should be possible to obtain between 300,000 and 400,000 E.H.P. from the Vuoxen River.

In the northern part there are not so many or so large waterfalls as in the south; amongst them may be mentioned the Kajana Falls and those formed by the Ulea River.

Up to the present time only comparatively few of the many waterfalls have been harnessed, and then chiefly by private people in the pulp, paper and chemical industries. Experts have, however, long been pointing out what an immense economic loss to the country it is to employ foreign coal or wood as fuel for locomotives, when the country has such an abundance of energy available in the form of water power.

Several foreign, Finnish and Russian Banks and financiers have, however, had their attention directed towards this important question, and have made a start with the harnessing of waterfalls for the production of energy for railways, lighting, and industry, and the State is also engaged on the same matter.

A German financial syndicate, consisting of the Deutsche Bank, Bank für Handel und Industrie, and Elektrische Licht und Kraftanlagen A.G., has thus bought the Vallinkoski and part of the Rouhialoukoski Waterfall for a total sum of nearly £250,000.

The railway authorities are now considering a project for the electrification of three different railway lines, the total length of which is 678 km. Among these is the line between Wiborg-Helsingfors and St. Petersburg, for the running of which there will be required 33,000 H.P., which will be derived from the Vallinkoski waterfall.

Another syndicate has been formed in Brussels for the acquisition of those waterfalls in the Vuoxen River which are in private hands, and some Russian groups are also making preparations to get their share of the Finnish waterfalls.

The Finnish Senate has had plans worked out for the harnessing of the Imatra Waterfalls and a couple of others in the Vuoxen River, and in the preparation of these plans special precautions have been taken with the view of avoiding injury to the beauty of the surrounding scenery. Part of the energy to be produced by these falls will be employed for the electrical towing of ships in the Saima Canal. This canal, which connects the southern part of the Saima Lake with the Gulf of Bothnia, was opened for traffic in 1856, and has a length of 59·3 km. The width at the bottom is 11·9 m., which, however, is reduced to 7·4 m. at those places where the canal has to pass rocks. The depth is 2·7 metres. The difference in height between the sea and the level of the Saima Lake is 75·9 m., and there are in all 28 locks, through which the vessels have to pass. In 1910 the number of boats passing through this canal was 7,000. It has been designed for vessels with a maximum length of 31·2 m., a width of 7·1 m. and a draught of 2·5 m.

ELECTRIC BATTERY VEHICLES.

THIS subject was discussed by the SCOTTISH LOCAL SECTION OF THE INSTITUTION OF ELECTRICAL ENGINEERS on March 24th. For an abstract of Mr. F. Ayton's introductory statement see ELECTRICAL REVIEW, page 557.

MR. HALLEY CRAIG (Glasgow) said he thought the results spoken of by Mr. Ayton justified them in saying that there was no doubt a field for the electric vehicle. But the petrol vehicle held the field at present, and before they could expect a share of the business a great deal of uphill work had to be done. He, personally, was much interested in the Edison battery as against the lead batteries. He spoke with 20 years' experience of lead batteries, and he suggested that if the Corporation of Glasgow and other power producing concerns would provide charging facilities on more extensive lines than at present, the popularity of the electrically-driven vehicle would be sure to improve.

MR. WATSON (London) thought that the Corporation of Glasgow, with its good charging facilities, should indicate where such vehicles could be charged. Enthusiasm for the electric vehicle was rapidly developing. There was no doubt that the bulk of municipal work in the next few years would be taken up by electrically-propelled vehicles. The Edison accumulator business, established here two years ago, while not actually trading in batteries, could take the credit of opening up and causing an interest in active work in this direction. Some time ago they had orders at the rate of one a week; now they had increased to two a week, and from the number of inquiries which were being received they anticipated that it would soon be three a week. He was confident that the increase would be very rapid, for in America he was informed that the numbers of electrically-propelled vehicles had risen from 23,000 to 30,000 since Christmas. Good charging facilities were, however, most essential. The manufacturers were doing their utmost to get assistance from central-station engineers, and some of the latter had acquired electrical vehicles, which was a sign that they believed in what they were preaching. When electric vehicles were sold they were supplied with an ampere-hour meter, which showed at a glance the position in which the van stood with regard to current, and if the van was let down it was to a certain extent the driver's fault. He was present at a test which was made recently for a firm of brewers. The van was a 2-ton vehicle, and the load, besides that of four men, was 2 tons 17 cwt. The van was capable of doing 40 miles in very dry weather, though 45 could be got out of it. The van was driven right across London to the top of Highgate Hill. With special instruments for taking the readings he found that they were taking 80 amperes on the flat, at the foot of the hill 140 amperes, and at the highest point 240 amperes. They returned at 35 miles per hour to the garage three or four miles away, and he discovered on calculating that the total consumption was 48 units, equal to a cost of four shillings. When they got figures like that they would agree that there must be a future before the electrically-propelled vehicle.

PROF. BAILEY (Edinburgh) said they must put down practically the whole of the success attained to the Edison battery. If they had a battery running, say, four years, with running costs one-third the cost of petrol, the case for the electric vehicle was made out. The only trouble was the expense of the accumulators at the present moment, and the price of the car would have to be brought down to compete with the petrol vehicle. It was difficult to make a saving in the running cost in the case of the private pleasure car, and the extra cost in the case of the electric battery in the first instance would militate against it. Then there was the difficulty of charging, and in his opinion a special machine would have to be brought out if a man was to own his own charging plant at a reasonable price.

MR. W. W. LACKIE (Glasgow) stated that the electricity department of the Glasgow Corporation had had an electric vehicle in use for a year, and, from the returns which he had had prepared, he was satisfied that the vehicle was doing the work of two horse vans. A horse and van could be hired in Glasgow for £12 to £14 a month, and the electric vehicle cost them about £24 a month, but whereas the horse and van were only available for 10 hours a day from Monday to Friday, for four hours on Saturday, and not at all on Sunday, the electric vehicle was available for seven days a week and 24 hours a day. It was agreed that the petrol car had a sphere for which the electric car at its present stage was not suited, but for town work there was no doubt at all that the electric vehicle had many advantages over the petrol car. In Chicago, last year, he saw (without exaggeration) hundreds of electric pleasure vehicles, and many of these were driven by ladies. It was a common thing there for a lady and gentleman to drive to the theatre, leave the car at the theatre door, and drive home again when the performance was over. Mr. Dalrymple (the tramways manager) mentioned in his report of his recent tour in the States that he saw hundreds of people going to business daily in Detroit with their own cars, which they simply left in the street until the time came for returning home in the evening. These, however, were Ford cars driven with petrol. He was told that in Chicago there were 700 electric commercial vehicles and 3,000 pleasure electric vehicles, as against about 1,800 petrol cars. In Glasgow there were about 3,000 motor-cars, 1,600 motor cycles, and 200 heavy motor vehicles, a total of 4,800, all of them petrol driven, of course, with the exception of the electric vehicle belonging to the electricity department. If the electric vehicle could be brought down to the price of the petrol car, there was no doubt that it would stand comparison in other respects. He would certainly be satisfied with 10 per cent. depreciation on an electric vehicle, whereas it was customary to write off 20 to 25 per cent. in the case of a petrol car. With electricity at 1d. per unit the cost

of fuel was one-third what it was for petrol. There was one point about which he was not satisfied at present, viz., the adoption of 110 volts as the standard pressure for charging batteries. This pressure had been adopted from American practice where they had never gone in for 200 and 250 volts for lighting purposes. He thought it would simplify matters very much if the battery makers would supply in this country a battery suitable for plugging on to a 250-volt circuit with a small resistance. He learned in New York that one company was prepared to supply either an Edison battery or a lead battery, but the price for the Edison battery was much higher than the price for the lead battery, the Edison battery costing about three times as much as the lead one. The lead battery was guaranteed to do 9,000 miles, and after that it could be renewed for £40. It would appear that if the Edison battery lasted for four years, which it was guaranteed to do, it was to be preferred to the lead battery. The cost of a lead battery was £72, and of the Edison battery £201 for a half-ton truck.

Mr. W. L. Spence (Glasgow) thought that if the electric-battery vehicles were to be adopted, they would have to be more moderate in capital cost than at present. Few people could afford to have electric-battery vehicles at the present high prices, and as electrical engineers they were wise in not boasting too much of the Edison battery from the commercial point of view. The capital cost was high, and there was no immediate prospect of its reduction. The commercial point of view was first cost, and he thought it would pay to use lead batteries, because of the very reduced cost and the possibility of a further reduction at an early date. The motors most used seemed to be series-wound, and he thought it an extraordinary mistake with a storage battery, which was essentially a constant-voltage affair; there ought to be a motor to suit it. With series motors all control was necessarily rheostatic. They might have commutation and combination of battery cells, but that in battery practice was not a good scheme. It was much better to keep their battery as a single block, and for that purpose they were better with a shunt-wound motor. He suggested that a motor with a speed range of 20 miles should be used. After all, the petrol motor was hardly comparable with the electric motor. It was a continuous-torque machine, and could be driven upon top speed. Mr. Spence showed a diagram of an electric vehicle, the principal feature of which was the shunt winding, variable-speed gear and double traction gear driving upon a live axle. With an apparatus of this sort the battery would not run to any excessive cost, and the chassis without the body should not cost more than £75 or £80.

Mr. Robertson (Glasgow) was of opinion that doctors and other professional men would favour the electric vehicle if they had some method of charging at their own homes. The electric vehicle was far and away the best for the professional man because of the ease of control, absence of vibration, cleanliness, and the fact that it could be started from the seat. He thought some way might be arrived at so that batteries could be standardised. If that were done and some kind of exchange set up, this form of traction would become very much more popular. He suggested the establishment of roadside depôts for recharging or supplying batteries, but standardisation of voltage was necessary.

Mr. Seddon (Edinburgh) hoped it would only be a question of a short time before the electric vehicle took a large share of the traffic. He agreed with the previous speaker that the shunt motor appeared to be of higher efficiency upon a general line of running with the motor connected across the terminals of the battery. With regard to the cost of Edison batteries, he believed that if the price went down it would tempt people to take a bigger interest in the batteries, and judging from the number of lead cells in use, one could readily appreciate the fact that the Edison battery was too high in cost.

The Chairman (Mr. J. A. Robertson, Greenock) also spoke on standardisation. He thought this was one of those cases where standardisation did not mean stagnation as in other branches of industry, and they could put a much better design on the market here than in America, where the industry had developed very rapidly. It might be asked why they were so very far behind in this country, with little or no development in the electric vehicle industry, while in the United States there were 37,000 in use, and on the Continent large numbers were to be seen. He thought one of the reasons was the want of co-ordination between the manufacturing industry and the generating industry. In America the supply was in the hands of the manufacturers, and in this country it was in the hands of the municipality, and that might be a disadvantage. He thought, however, that the largest development was to be looked for in this country from the commercial vehicle for some years to come, and the municipalities were in a position to take the lead over any private company. They required a large number of vehicles for different purposes, for refuse collecting, street sweeping and street watering, and for other purposes, and for these the electric vehicle was suitable. Mr. Page showed slides of the Paris garage and the motor-vehicles there. He was in Paris in May on the occasion of the Institution meeting, and went to see one of the new destructors put up there, and at the same time saw one of these machines which had been in use for a year and a-half, and seven which had been in use for shorter periods. As a result of these experiments the Paris municipality had at that time just decided to change from the horse-drawn service to the electric vehicle. After making trials with petrol and electric vehicles, and comparing them with horse service, they had come to that decision. He was not at liberty to give figures, but these showed a decided saving over horse traction, and a decided saving over petrol, the ratio being approximately 60 per cent. for electric vehicles against 100 for petrol. His experience in Greenock was that a petrol-driven motor worked out at 2·1d. per ton-mile. He was speaking of a commercial motor, 4 tons, operating in a fairly hilly district, and 2d. per ton-mile was not an expensive figure, particularly for their district. The lead cell had hardly been done justice to, but he thought for these heavy commercial vehicles there was a great future still for the lead cell, and those wagons he saw in Paris were fitted up with lead cells. Mr. Edison had given them a cell with distinct advantages over the lead cell, and one which for the light pleasure vehicle was more suitable than the lead type could be.

Mr. Page, who read the paper in the author's absence, in the course of his reply said the suggestion that the electric vehicle manufacturers should get out batteries with a voltage of something like 200 volts was about the likeliest way out of the difficulty if space could be found for the batteries. In cases where charging facilities were required, the Glasgow Corporation would not be found wanting. It was good news to hear from Mr. Watson that orders were going up in number, but they would certainly be more if Mr. Watson's firm would cut down the first charge. The Glasgow Corporation electric van cost £560 without the body, which came to about £45, so that the overall price was in the neighbourhood of £600, and they got a petrol van to do the same work for about £400. The field of the electric car was definite and clear to them at present. They were not out to try to compete with petrol cars and he did not think they would. The lead battery as compared with the Edison battery had at least double the weight, and that that would militate considerably against the extensive use of lead batteries. He did not agree with the shunt-wound motor, and if they were going into the gearing question they would lose one of the soundest arguments for pushing electric vehicles, and that was simplicity of control.

THE FIRST ELECTRIC RAILWAY IN SPAIN.

The Southern Railway Co. of Spain serves the important territory between Linares and Almeria, and, in particular, the mining districts in the province of Santa Fé. Practically the whole of the 14 miles of single track between Gergal and Santa Fé comprises gradients of 1 : 35, and by the year 1906 mineral traffic had become so heavy that steam working was very difficult on this route. The average weight of empty trains ascending to Gergal is 150 tons, and of laden trains descending to Santa Fé is 450 tons. It was decided to adopt three-phase electric traction for goods and mineral service retaining, at least temporarily, steam traction for the comparatively unimportant passenger service. The speed of ascent has since been raised from 7½ to 15½ m.p.h., the traffic capacity of the line being correspondingly increased. It is arranged that up and down trains run in pairs, and pass each other at the intermediate station of Fuente-Sante. The three-phase system was chosen in order to make possible simple regenerative working, to which the contour and general circumstances of the system are very favourable. The heavy descending trains are kept easily and efficiently under control, and light ascending trains are propelled by the energy recuperated.

A steam-driven central station has been erected at Santa Fé, which will be near the centre of the line when the latter is extended to Almeria. A 750-kw. ($\cos\phi = 0{\cdot}8$), 6,000-volt, 25-cycle alternator, capable of supplying 20 per cent. overload for half an hour, is driven at 107 r.p.m. by a direct-coupled cross-compound jet condensing Lenz steam engine. The generating set is provided with a 30-ton 16-ft. fly-wheel securing a coefficient of cyclic irregularity of 1 : 250. From this fly-wheel a 25-kw. exciter is belt-driven. Two De Naeyer boilers with 3,050 sq. ft. of heating surface provide 7,700 lb. of steam per hour (11,000 lb. on overload) at 170 lb. per sq. in., and superheated to 300° C. A liquid resistance is installed to absorb automatically any excess of regenerated energy over that required by the ascending train. At present the station lies at one end of the line, and 5,500 volts mean line pressure is maintained by a Tirrill regulator connected through 3·14 sq. mm. pilot leads to a pressure transformer at Fuente-Sante.

Two 8-mm. copper wires are suspended over each track, the rails serving as the third conductor. Over bridges, the wires are carried by tubular iron structures of simple but substantial construction. In tunnels (which vary in length from 312 to 1,050 ft.) the conductors are carried by cross wires anchored to the roofing; the points of suspension of the conductors lie from 15 ft. 9 in. to 16 ft. 6 in. above rail flanges, and the lowest point in the conductors lies 9 in. or 10 in. above the loading gauge. Posts are spaced 1,150 ft. apart on straight, and 720 to 920 ft. on curved track. Arrangements are made for the accommodation of a h.t. three-phase feeder when the line is extended 11 miles to Dona Maria. In the open, the conductors are suspended at a height of 18 ft. 6 in. from span wires attached through Ambroin insulators (porcelain in stations and tunnels), and a strainer to galvanised iron rings which are nailed to the posts after adjusting the height of the conductor. The contact lines are attached to the span wires by special carriers with ebonite and porcelain insulation tested to 10,000 volts. Wurtz lightning arresters are installed at the terminal and intermediate stations. A paste bond was tried, without success, between the rail joints; Carpentier-Riviere flexible bonds are now riveted beneath the rails, and cross connections are made every 100 yd. or so.

The existing rails being retained, it was necessary, in

selecting electric tractors, to limit the load per axle to 13 tons. Allowing for the steep gradient and the weight of trains to be hauled, it was decided provisionally to use 4-axle, 52-ton locomotives. Instead of using single 640-H.P. 4-axle locomotives, it was decided to use two 320-H.P. 2-axle locomotives for each train, thus securing reserve equipment at minimum cost and providing economical and flexible units for shunting work and the like. When using two locomotives, control is from either cab. The electrical equipment is by Brown-Boveri, the mechanical by the Ateliers Suisse Construction des Wagons. Five tractors are at present in use, the general arrangement and dimensions being as in fig. 1*: four windows and six doors are provided. Each carries a 300-K.V.A., 5,200/450-volt transformer as shown. The motors are 6/12 pole machines of the three-phase squirrel-cage type, rated at 220/160 H.P., 450 volts, 500/250 R.P.M., 25 cycles, and geared 1 : 4·5 to the axles. The weight of each motor, including gears and gear case, is 3 tons, and of the mechanical and electrical equipment on each locomotive, 13 tons each. The normal speed is

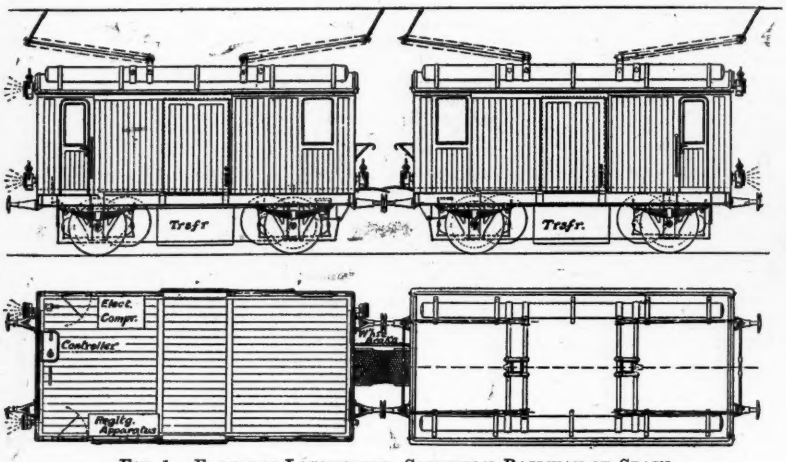


FIG. 1.—ELECTRIC LOCOMOTIVE, SOUTHERN RAILWAY OF SPAIN.

15½ M.P.H., but in case of need, and to facilitate starting, the number of stator poles in the motor may be doubled; the maximum speed is thus halved and the tractive effort increased 45 per cent. To improved the starting torque, and to increase the short-circuit current, suitable resistances with large cooling surfaces are mounted between the rotor bars and short-circuiting ring. Five tappings on the low-tension side of each transformer provide for the application of reduced pressure to the motor stator on starting; the necessary switching operations are performed by servo-motors, on each locomotive and a single master controller; complete wiring diagrams are to be found *loc. cit.* The motor characteristics with 6 and 12 poles respectively are:—Full load H.P., 220, 160; R.P.M., 450, 225; cos ϕ, 0·96, 0·87; efficiency, 89 per cent., 85 per cent.; temperature rise on sustained full load output (6 poles, 220 H.P.)—stator windings, 70° C.; stator plates, 52° C.

Each locomotive is provided with a bipolar collector bow; a 6-H.P. transformer ventilating fan; and a compressor capable of compressing 17½ cb. ft. of air per minute to 100 lb. per sq. in. Pressure in the air reservoir is maintained automatically between 80 and 100 lb.; should it fall below 80 lb., for any reason, the overhead contact bows fall, hence the train cannot run when the air pressure required for braking is not available. If the line pressure is low, due to simultaneous heavy demands, it may be necessary to place the motor controller on the 550-volt contact to obtain full rated output; normally the latter is obtainable on the last notch but one (450 volts). To secure maximum efficiency whether of driving or regenerative braking, the motors are operated whenever possible on one of the last two controller notches.

Electrification was effected without derangement of service, and perfectly satisfactory operation has been obtained since electric working was commenced in June, 1911. So long as the time table is observed, the central station has to supply appreciable energy only during starting periods. At other times, energy generated by the descending train suffices to drive the ascending train. Although the motors are exposed continuously to an impalpable dust of iron ore, they have given no trouble.

Electric Steel Works.—It is announced that the important electric steel works belonging to the Société Electro-metallurgique P. Girod, of Ugine, Savoy, which has a share capital of £480,000, have passed into the possession of Schneider & Co., of Creusot. The headquarters of the former are at Ugine, and the company also has four French branches at St. Gervais, Bionnay, Venthon and Queige, and a further one at Gourtepin, Switzerland. The works, which find employment for 600 men, produce ferro-manganese, ferro-silicon, ferro-tungsten, and all sorts of electro-steel.

* See also "La Technique Moderne," pp. 170-175, 1914.

NEW ELECTRICAL DEVICES, FITTINGS AND PLANT.

Small Power Dynamos, &c.

WE have received from the SMALL POWER DYNAMO AND MOTOR CO., of Openshaw, copies of their latest list dealing with D.C. dynamos and motors, motor-generators and rotary converters, in sizes from $\frac{1}{16}$ to 3 H.P. squirrel-cage motors, and A.C.—D.C. motor-generators.

The direct-current machines are fitted with slotted drum type armatures running in phosphor bronze bearings provided with ring lubrication. The field coils are former wound; carbon commutator brushes are used. The machines are carefully tested and will carry an overload of 25 per cent. for 30 minutes and 50 per cent. for a few minutes without injurious heating or sparking.

The machines are built of either open, semi or totally-enclosed types; shunt, series or compound wound; and are fitted with ball bearings if required. From the numerous machines illustrated, we have selected the firm's small direct-current rotary converter and totally-enclosed ball-bearing grinding motor for illustration.

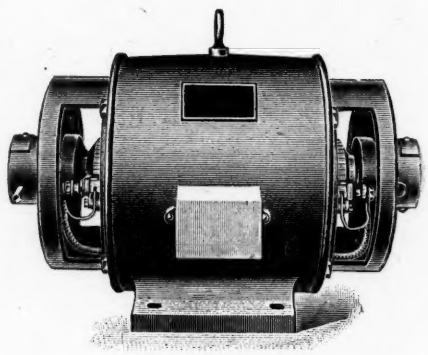


FIG. 1.—SMALL D.C. ROTARY CONVERTER.

The converter, fig. 1, built for outputs between 40 and 700 watts, has a double-wound armature with a commutator at each end, and is designed to run on primary voltages ranging from 100 to 250

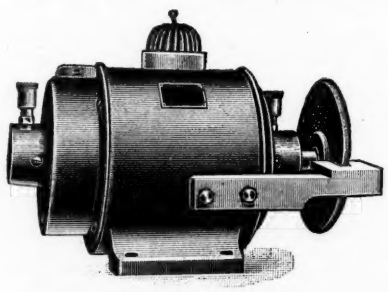


FIG. 2.—GRINDING MOTOR, SMALL POWER D. & M. CO.

The grinding motor, fig. 2, is built in sizes of from ⅛ to 3 H.P., speed 2,000 to 1,700 R.P.M., and an adjustable tool rest is fitted. Similar machines, but with projecting screwed shafts, are supplied for polishing.

It will be gathered that the company have laid themselves out to cater for the small motor business, and their list contains detailed information as to output, price, &c.

Small Portable Electric Pumps.

The portability of electric power for small pumping operations has, perhaps, not been realised to the very fullest extent, and it is probable that quite a considerable amount of progress can be made in this direction. As an example of one method by means of which this problem has been attacked, we may mention an interesting portable equipment for small work which has been put on the market by the EDWARDS MANUFACTURING CO., of Cincinnati. This is shown in fig. 3, and illustrates a very neat form of self-contained vertical drive in which the return water pipes are utilised to act as a bracing for the connecting shaft between the motor and the pump itself. In order to compensate for any slight lack of alignment, should this occur, a form of universal joint is used in the connection between the motor and pump. The working parts of the pump are made of brass, and the rotor is run in ball-bearings and is self-lubricating. As the motor is mounted on the exhaust pipework it sustains its own weight, and as there are no intermediate bearings on the shaft, there is obviously no wear on the parts. It is claimed that for the smaller outputs which are

required for pumping out barges, boats, &c., say about 60 gallons per minute, the motor can be put into operation by connecting it to an incandescent lamp socket, and the motor is built either for direct or alternating current. It is furnished with means for swinging if necessary, and as the pump itself is of the valveless type, there is no danger from muddy water, while as the apparatus is self-draining, the occurrence of cold weather does not entail risk of freezing internally contained water.

In larger sizes the pump is specially built for heavy work, and its operation under such circumstances is shown in fig. 4, this plant pumping 350 gallons per minute at the installation of the

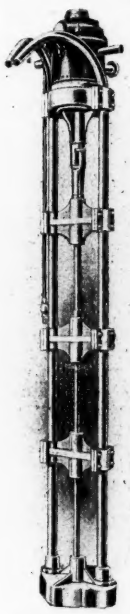


FIG. 3.—SELF-CONTAINED PORTABLE PUMP.

FIG. 4.—PUMP IN OPERATION.

Marmet Coal Co., Cincinnati. As the motor is hung in a bracket at the top of the pump, the drive shaft is relieved of unnecessary weight. The motor can also be lifted from the bracket and carried separately from the pump if necessary. The motor is waterproof and can thus be operated in rain, and is also air-cooled, preventing the motor from running hot on steady runs. The usual length of standard is 10 ft. For an output of 60 gallons per minute a ½-H.P. motor is installed, while for 250 gallons per minute the motor is of 7-H.P. capacity. For bilge pumping, small drainage services, &c., the pumps appear to offer a very good means of dealing with difficulties.

Central Lamp Suspension.

Referring to the growing tendency on the part of municipal authorities to suspend lamps centrally over the streets instead of using lamp standards on the kerb, where they impede traffic, the

FIG. 5.—BROMLEY HIGH STREET; SUSPENDED LIGHTING.

LONDON ELECTRIC FIRM, of Croydon, point out that the difficulties met with in adopting this plan in streets of irregular frontages can easily be surmounted.

For a considerable period the lighting of the main street of Bromley (Kent) has been carried out largely by means of centrally suspended arc lamps, the traders in this street having insisted on the provision of improved illumination. Where a low building is met with, the suspending cable is either attached to a short pole or to a chimney stack, as shown in the accompanying illustration. There is no difficulty in doing this. The cables are, of course, exaggerated in the view to make them visible.

A Simplex Sign.

Electrical contractors should remember that some of the positions which might be profitably employed for placing an electric sign are not appreciated by advertisers. The more unusual the design or application of an electric sign the better chance there is

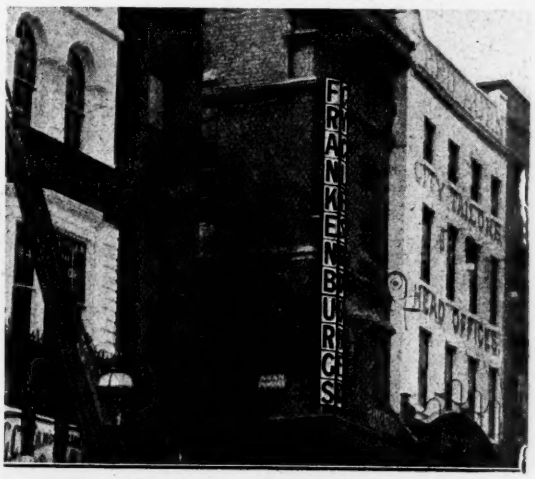


FIG. 6.—SIMPLEX SIGN AT BIRMINGHAM.

of the subsequent effect being remunerative to the advertisers, and hence there is more likelihood of the contractor making a sale. Firms specialising in this class of work, such as SIMPLEX CONDUITS, LTD., Garrison Lane, Birmingham, are always willing and in a position to assist the contractor by suggestions and suitable designs.

The accompanying view, fig. 6, shows a Simplex sign erected in Birmingham. It is three-sided, over 25 ft. high, each letter measuring 24 in., alternate spaces being arranged as a door for changing lamps or inspection purposes. Twenty-four 50-C.P. lamps are used for lighting, and the sign is legible at a great distance.

The Econo Vacuum Cleaner.

MESSRS. DUNCAN WATSON & CO., of 62, Berners Street, W., have recently introduced a neat little vacuum cleaner of somewhat similar shape to, but cheaper construction than, their well-known Santo machine. The new machine—the Econo—stands 18 in. high, and is 11 in. in diameter, weighing only 23 lb. It contains a double fan driven by a universal motor, which is easily adapted for use on either A.C. or D.C. circuits. Each machine has a small resistance in the base, which is cut out for alternating-current working by a screw plug. An internal oil reservoir is fitted, which can be filled from outside, and provides the necessary lubrication for many months' use. The parts are standardised; a metallic suction hose is provided, and the machine taking less than ⅓ unit per hour can be attached to an ordinary lampholder.

Vitreous Tiles.

MESSRS. CHANCE BROTHERS & CO., LTD., of 28, Victoria Street, Westminster, have recently brought out a new line of vitreous tiles and mosaics which possess exceptional qualities. These tiles are of granular structure, and are made in moulds which provide them with serrations on the back, so that they take a firm hold of the cement. They are of the same material throughout so that they do not flake or craze, and they can be had in a great variety of colours. The tiles are suitable for facing the walls and floors of engine rooms, &c., and would make an excellent substitute for glass in the flooring of switchboard galleries, being, in fact, closely akin to glass, and capable of being cut with a diamond; they never become slippery, and, if worn right through, would keep their colour to the last. They can be cut to any shape, and make excellent mosaics, while their cost is quite moderate.

Small Steam Turbines.

MESSRS. R. S. PRICE, LTD., of 12, Norfolk Street, London, W.C., are introducing small turbines of powers from ½ H.P. upwards, for direct coupling to fans, blowers and turbine pumps, &c. The turbines are of the single-disk axial-flow impulse type, the velocity of the steam being utilised in stages by causing it to pass and repass through the same set of blades. The great simplicity of this type enables it to be constructed in compact form and at low cost, and it gives the desired output without excessive speed of revolution.

"Nightingall" Automatic Cookers.

From the GENERAL ELECTRIC CO., LTD., of 67, Queen Victoria Street, E.C., we have received particulars of the "Nightingall" electric cookers, which we illustrate in figs. 7 and 8, on p. 888.

This cooker is built up of sheet metal on an angle iron frame, and is double cased and lagged. The heating element, rated at 1,800 watts, is situated in the bottom, protected by a wire frame, and is automatically controlled by a mercury thermometer fitted at the back of the cooker, which gives heat steps of 200°, 300°, 400° and 500° F. The column of mercury actuates a solenoid

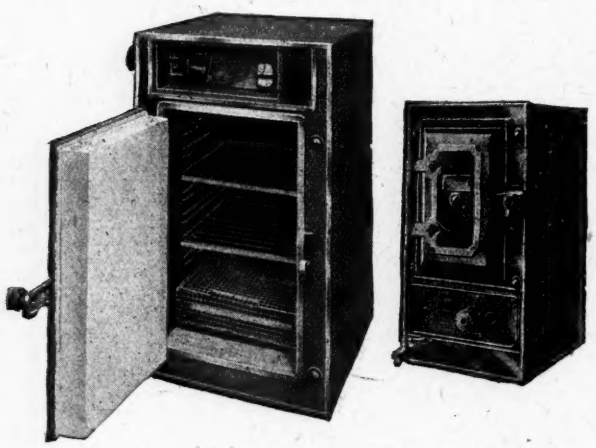


FIG. 7.—NIGHTINGALL AUTOMATIC COOKER.

FIG. 8.—AUTOMATIC STEAMER.

switch, which cuts off current as soon as the heat of the oven has arrived at the predetermined temperature.

Both current and temperature being controlled at one point, no special knowledge is required for the operator, and the oven is practically "foolproof."

The "Nightingall" steamer is constructed on similar lines, but is smaller. Automatic control is given with two temperatures—high, which equals a steam pressure of about 2 lb.; and low, which is just above boiling point. The heater is of 800 watts rating, of the immersion type, placed in a water space at the bottom.

Steel Works Electrification.

That the efficiency of blast furnaces is greatly increased by the removal of moisture from the blast is undisputed. Very many ways in which the moisture can be removed are in existence, the

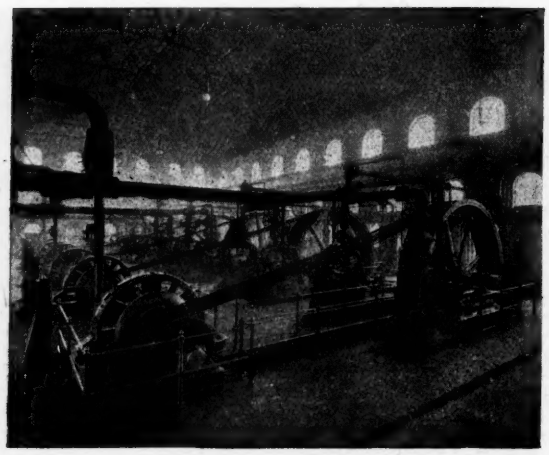


FIG. 9.—WITTON MOTORS DRIVING AMMONIA COMPRESSORS.

majority involving the use of some chemical substance, such as chloride of calcium, to absorb the moisture. These processes, however, leave much to be desired in the efficacy with which they remove the moisture, and a method which has found far greater approval consists in converting the atmospheric moisture into snow which can then be readily removed.

A large plant, working on this principle, has recently been installed in the Midlands. It consists of six 400-H.P. D.C. "Witton" motors, with cast-steel shells, driving "Haslam" ammonia compressors; the accompanying view, fig. 9, gives an excellent idea of this plant. The motors have interpoles and are controlled by switchgear standing by each set. The ammonia compressors work in conjunction with a refrigerating plant, producing cold brine which cools a series of pipes. The blast on its way to the blowing engine is passed through these pipes, which are in duplicate, and the snow is removed from the interior surface of one set at frequent intervals, the other set meanwhile being in commission for the refrigerating process. The electric motor equipment for this installation was supplied by the GENERAL ELECTRIC CO., LTD.

LEGAL.

ATTORNEY-GENERAL *v.* LONG EATON URBAN DISTRICT COUNCIL.

MR. JUSTICE SARGANT, on May 12th, delivered his reserved judgment in the action brought by the Attorney-General, at the relation of the Long Eaton Gas Co., to prevent an alleged undue preference being given to consumers of the defendant Council's electric supply.

The case was heard on April 3rd, 6th and 7th last, and fully reported in the ELECTRICAL REVIEW at pp. 616 and 649.

MR. JUSTICE SARGANT, in giving judgment, said that in this action the Attorney-General, on the relation of the Long Eaton Gas Co., was seeking to restrain an alleged breach by the Long Eaton Urban District Council of the provisions of Secs. 19 and 20 of the Electric Lighting Act, 1882. The most important rates of charges are, for the purpose of this action:—(1) For lighting houses, shops and other premises, except factories, a flat rate of 3½d. per unit, less 10 per cent. discount; (2) for lighting factories, 3d. per unit for the first 2,000 units per quarter, afterwards 2d. per unit less, in each case certain discounts, increasing with the amount of the account; and (3) for power or heating, for a consumption not exceeding 250 units per quarter, 2d. per unit, and for larger consumptions per quarter a gradually decreasing charge per unit, until for a consumption between 4,000 and 6,000 units per quarter the rate is 1d. per unit, and for a consumption exceeding 6,000 units per quarter the rate is ¾d. per unit. The difference in the rates of charge for lighting and power respectively involves this, namely, that if a consumer desires a supply for power as well as a supply for light, he must have a separate circuit on his premises for the supply for each purpose, each circuit being separately connected with the mains, and having a separate meter at its terminals. Each such circuit is as separate, electrically speaking, from the other as if it furnished a separate supply to a different consumer; and the consumer who has the two circuits can use the maximum supply of electricity through each circuit simultaneously. What has given rise to the present proceedings is a circular which was issued by the Council on or about September 25th, 1911, and which is couched in the following terms, namely:—"Dear Sir,—I am directed by my Council to inform you that the following resolution has been adopted with reference to the price charged for electricity to power consumers, which will take effect as stated therein:—Revision of electricity charges. The Committee having fully considered this matter recommend that the present scale of charges remain in force where power and lighting are both taken exclusively from the Council's electricity mains, but in cases where electricity supply is taken for power only or for power and partial lighting, the lowest scale of charges, where the number of units consumed during any quarter exceeds 4,000, shall be 1d. per unit, and otherwise according to the existing scale. Such amended charge to commence on January 1st, 1912." It is alleged that the differentiation expressed in this circular between those large consumers of power who take power and lighting exclusively from the Council's mains and those large consumers of power who take for power only, or for power and only partial lighting, is a breach of Secs. 19 and 20 of the Electric Lighting Act, 1882; and it is sought to restrain this differentiation by the injunction of this Court. Secs. 19 and 20 of the Electric Lighting Act are in the following terms: "(19) Where a supply of electricity is provided in any part of an area for private purposes, then except in so far as is otherwise provided by the terms of the licence, order or special Act authorising such supply, every company or person within that part of the area shall, on application, be entitled to a supply on the same terms on which any other company or person in such part of the area is entitled under similar circumstances to a corresponding supply." (20) "The undertakers shall not, in making any agreements for a supply of electricity, show any undue preference to any local authority, company or person, but, save as aforesaid, they may make such charges for the supply of electricity as may be agreed upon, not exceeding the limits of price imposed by or in pursuance of the licence, order or special Act authorising them to supply electricity. It is said by the plaintiff that both sections of the Act are infringed: Sec. 19, because the supply of electricity to B for power purposes is a supply corresponding with the supply to A for power purposes, and is applied for and given under similar circumstances; Sec. 20, because the lower charge to A is undue preference. It is said by the defendants as regards Sec. 19, first, that the supply to A for power and exclusive light is not a supply corresponding with a supply to B for power only and partial lighting; and secondly, that even if the supply to A for power has to be considered separately, and so "corresponds" with that to B, still, the circumstances are not similar in the two cases. As regards Sec. 20, the defendants say that there is sufficient dissimilarity in the conditions of supply between the two cases to prevent the difference of charge, though perhaps preferential, from amounting to an undue preference. The first defence as regards Sec. 19 seems to me a question of construction, and I will deal with that defence first. As already pointed out, any supply of electricity for power is in the ordinary course taken quite separately from any supply for lighting, namely, by a separate circuit connected with the mains by separate terminals and with a separate meter. And this being so, I think that according to any ordinary use of words, the Council must be said to be offering not a single supply of electricity but an alternative supply, and that any consumer taking power and light in the ordinary way on separate circuits, would be said to be taking not a single supply but two supplies, namely, a supply for power and a supply for light. And I can see no sufficient reason for

cutting down the beneficial operation of Sec. 19 so as to prevent its application to each such separate supply. In my judgment, the hypothetical consumer B, though taking a supply for power only, is taking a supply corresponding with the like supply of energy to A for power purposes, although A may also be taking an additional separate supply for light. And if any differentiation is allowed betweem them *qua* their respective supplies for power, it must be on the ground that the circumstances are not similar in the two cases. The second defence as regards Sec. 19 and the defence as regards Sec. 20 seem to me to be very much the same, and to differ, if at all, only in degree. Under each section I think that the whole circumstances may be considered from the broadest possible point of view, and that the question is whether the circumstances affecting consumer A or consumer B in relation to their supply of power are substantially dissimilar or sufficiently dissimilar broadly to justify the differentiation proposed by the circular. The general language of the two sections, and their relation to each other, are curiously similar to those of Sec. 90 of the Railway Clauses Act, 1845, and Sec. 2 of the Railway and Canal Traffic Act, 1865. And some of the decisions under those Acts as well as the one or two decisions under the Act now in question, or equivalent legislation in the Colony of Melbourne are in point here. The most important and apposite of the railway cases that have been cited to us are the London and North-Western Railway *v.* Evershed, 3 Appeal Cases, p. 1029; Denaby Main Collieries Co. *v.* Manchester, Sheffield and Lincolnshire Railway, 11 Appeal Cases, p. 97; Baxendale *v.* Great Western Railway, 28 Law Journal, Common Pleas, p. 69; and Phipps *v.* London and North-Western Railway, 1892, 2 King's Bench, p. 229. From these cases and those of Metropolitan Electric Supply Co. *v.* Ginder, 1902, I Chancery, p. 411, and Attorney-General of Victoria *v.* Corporation of Melbourne, 1907, Appeal Cases, p. 469, I think a fairly clear distinction may be drawn for the present purpose between those reasons for making a lower or preferential charge which under legislation of this kind are legitimate and those which are illegitimate. It would seem that A must not be charged less than B, merely to overcome a greater reluctance on the part of A to become a customer, or to induce A to become a customer in respect of another supply, although either of these reasons might be a good commercial reason for charging less to A were the public undertakers merely carrying on any ordinary commercial business. On the other hand, any circumstances which render it less costly, or otherwise more profitable to supply A than B, constitute a legitimate reason for making a lower charge to A for the same supply. And if the Court came to the conclusion that some such circumstances existed, then proof would not be required that the diminution in the charge was precisely equivalent to the diminution in the cost of the supply. To apply these principles to the present case, if, as alleged by the relators, the object and result of the circular were to coax or induce those who took power only, or power and partial lighting, to take the whole of their lighting from the Council, and the extra custom thus obtained would not *per se* make the rendering of the existing service less costly or more profitable to the Council, then the policy of the circular would be wrong, and the differentiation between A and B would be illegal. But if, on the other hand, the combination of lighting or exclusive lighting would make the supply of power, or of power and partial lighting, to the customer in question less costly or more profitable, then there would be a justification for reducing the charge to A as compared with B, or (to follow the precise lines of the circular) for increasing the charge to B as compared with the charge to A. As I understand the argument, this view of the law was accepted on both sides, and the contest between the parties really resolved itself into one of fact, namely, whether as between customer A, who takes power exclusively and light exclusively from the Council, and customer B, who takes power exclusively but either no light or only part of his light, the taking by A of an exclusive supply of light renders it cheaper or more profitable to the Council to give a supply of power to him than to B. The onus of establishing this would appear to rest on the Council. Speaking generally, the technical and other evidence by which they sought to prove their case seemed to me extremely thin. On the other hand, no technical evidence at all was called by the plaintiff. In this state of things I must do the best I can on the materials before me. But should the same sort of question ever be brought out again with reference to a larger undertaking, there would be room for very much fuller and more complete technical evidence on both sides. One thing seems fairly clear from the evidence of Mr. William Jenkins—namely, that before making the change, the Council did not seek technical advice, and that in making it they were not acting on any reasoned or effective comparison with the cost of supplying the typical consumer A with power as compared with the cost of supplying B with power. Nor would it, I think, be doing the Council an injustice to say that the charge was made merely on a rough general view of commercial inducement to the consumer and commercial advantage to the Council in which no distinction was made between, on the one hand, coaxing or inducing customers to increase their custom by taking a second supply, and, on the other hand, lowering a charge to a customer for an existing supply by taking a supply of a different kind. They obviously had little if any idea as to what was or was not prohibited in this respect by their statutory obligations. Mr. Snell, the Council's expert, of course was better informed. But even he, as will be seen, fell into some mistake on this point. And he was apparently only called in long after the change and for the purpose of giving evidence in this action, and justifying the change *ex post facto*. If, therefore, the Council have a good and sustainable reason for giving lower terms for power to A than to B, this would seem to be due rather to good fortune than to good judgment. The only evidence in justification of the preference to customer A that has to be seriously considered is that of Mr. Snell, and a good deal of that evidence may be dealt with very briefly. At the end of his examination-in-chief he relied on the extra business thus secured in supplying energy for lighting; but this is an inadmissible reason. In another part of his evidence he pointed to the progressive improvement in the load factor of the undertaking down to the present time; but this had been taking place quite as much prior to the change as subsequently to it. And he also referred to the figures in relation to supply of various particular consumers, as to which I will say a few words a little later, but which when examined certainly do not seem to help his case. All this seems to me to be of very little if any value. The only part of Mr. Snell's evidence which struck me as really relevant or important was that in which he attempted to show that under the special conditions of Long Eaton the supply of energy for lighting factories is in a sense supplementary to the supply of energy for power and improves the load factor of the undertaking by providing a demand for the machinery at the defendants' power station at a time when it would otherwise be idle. Mr. Snell, of course, had to acknowledge that as the load factor for light is much worse than that for power a customer for both power and light has in general a worse load factor than a customer for power only. For inasmuch as he takes his maximum load for power, his total load factor is a mean between the worse load factor for light and the better load factor for power, though the lower load factor for light may be, and should if the relative price for light and power are fair, be compensated for by the higher price per unit charged for light. But he said that inasmuch as at Long Eaton some 20 per cent. of the power load, viz., that attributable to the winding machinery, is not working before 7 a.m. or after 7 p.m., the factory owner who takes light as well as power gives during the summer (by which I mean the lighter) months of the year an opportunity to that portion of the machinery at the central station which may be regarded as installed against the winding machine load of being used for the production of light during the whole or some of the hours between 7 p.m. and midnight, and the whole or some of the hours between 4 a.m. and daylight, or, in times of great activity, between midnight and daylight. And the result, said Mr. Snell, was that the load factor of such a consumer, consumer A, was improved, and that he was in truth a better customer—a customer who could be supplied more cheaply—than customer B. This would no doubt be quite true if no more machinery had to be installed to supply customer A than customer B, or if, what is much the same thing, load factor could properly be calculated with reference to the maximum demand or load during the summer months of the year, and not with reference to the maximum load throughout the whole of the year. But in fact the contrary is the case. The demand for electric lighting is, of course, a demand that varies seasonally, and the demand or load that really matters, and against which plant had to be installed, is that during the winter or dark months, as, indeed, is indicated in the calculation of load factor in the Council's accounts on the usual annual basis. Further, there is nothing whatever to prevent the period of maximum demand for lighting coinciding with the maximum or peak load for power; and, indeed, so far as the factories alone are concerned, there is a good deal to make the two synchronise. And accordingly it is quite clear that the typical consumer A, when compared with the typical consumer B, must be considered as necessitating the installation in the central station not merely of machinery sufficient to satisfy his demand for power, but also of extra machinery to satisfy his demand for light, and so as increasing to that extent the denomination of the fraction representing his load factor before its conversion into a percentage. If this be so it is difficult to see on what principle the machinery used to supply power to the winding machinery run by female labour can be considered as being profitably employed in supplying light to those parts of the factory which are run by male labour. For, *ex hypothesi*, other machinery has had already to be installed for the purpose of supplying light not merely to the principal part of the factory where the male labour goes on working, but also to that portion of the factory where female labour is employed, and where the supply of light is not required for any longer hours than the supply of power. When this difficulty was put to Mr. Snell, the only answer that he could give to it was that during the summer months the plant was overhauled, and that one by one the units at the central station were dismantled. But I cannot think that this explanation was at all adequate or satisfactory, having regard to the capacity of the station, viz., 950 KW., and having regard also to the marked difference (as shown by the summer and winter curves put in) of a maximum daily winter load of some 658 KW. and a maximum summer load of some 308 KW. This seasonal difference alone must obviously give ample opportunity for overhauling and for dismantling more than one unit at a time, unless the units are of size altogether disproportionate to the output of the station, and, indeed, are only two in number. And in the absence of anything like definite information on this point either from Mr. Snell or from the engineer of the Council, I cannot look on this supposed advantage with regard to overhaul as any real justification for the differentiation between consumer A and consumer B. It seems to me that large user being already allowed for in the condition that 6,000 units are to be consumed per quarter, and there being no *constat* that consumer A does, in fact, consume more altogether than consumer B, whose bill for power alone may largely exceed that for the power and light consumed by A, no real reason has been shown for regarding A as a more profitable customer than B. A's load factor, calculating it in the ordinary and proper way over the year, and not over a portion of it, is worse than B's, and worse substantially in proportion to the

amount of light he takes, as, indeed, it should be having regard to the fact that he pays more per unit for light. And the taking of two supplies by A does not involve any diversity factor in A's demand, if I rightly apprehend the sense in which Mr. Snell used that term. For A's peak time for power and peak time for light, may be, and often are, concurrent, the whole factory, of course, requiring to be lighted, for instance, at 6 p.m. during the winter months when the demand for power is in full force. Though I have defined B as a customer who either takes for power only or takes for power and partial lighting, I have hitherto considered him in the light of the first alternative, namely, as taking for power only. But if he is now considered as taking for power and for partial lighting, any differentiation between him and A is even less, and the preference shown to A is even less defensible. He may well be taking more for power than A, and more for light than A, and may be taking them in the same relative proportions as A. And yet if he takes any light at all from any other source, he is to be denied the allowance of 25 per cent. made to A. This is not in my judgment a mere isolated or exceptional case of hardship such as might be found under any sale increasing by definite steps, but an example of a class of cases likely to occur and specially aimed at by the circular. It seems to me impossible to justify such a differentiation as this. And the express making of the differentiation is a very strong indication that the reason for making it was not the relative cheapness of supplying A, but the desire to oust competition in supplying light. The only other matter I need refer to is a table called Appendix A, which was put in by the Council for the purpose of showing the average price paid by the 17 consumers who fall within the same class as the hypothetical consumer A. So far as it goes, that table seems to me to tell strongly against the Council. On the two scales adopted by the Council, each of no less than 7 of these 16 consumers pays less to the Council for power and lighting together than he would do if he took the same amount of power alone. And the whole number of these consumers who, together take very much more than half the total units supplied by the Council, only pay £34 5s. 2d. extra for the 81,098 units supplied to them for lighting purposes. Now, not only are those units nearly one-tenth of the units taken for power, for which £2,799 18s. 4d. is paid, but having regard to the difference in load factor between light and power, they must require an installation of probably about one-third of the machinery which is required for the power units taken by these consumers. And as stated at the foot of the table that the Council reduce accordingly, if 1d. per unit is a proper sum for a supply of power, and 3d. per unit is a proper sum for a supply of light, it is obvious that the supply of light to these customers causes the Council an extraordinary loss. The foot-note in the table in the following terms, viz.: "Thus to acquire 9·16 per cent. more business, the company reduce the price 6½ per cent.," may throw some light on the object with which the reduction is proposed to be made as between A and B. But the comparison made by it is obviously wrong. For it assumes that, but for the reduction, the 81,098 units of light, as well as the 884,938 units of power, would have been taken, and would have been charged for at 1d. Further, the reduction is, of course, not 6½ per cent. at all, but 25 per cent., viz., from 1d. to ¾d. And the commercial effect is that 81,098 units of light which ordinarily would, at 3d., cost £1,013 14s., are, in fact, supplied for £34 5s. 2d. In the result I come to the conclusion that there is a breach both of Sec. 19 and of Sec. 20—of Sec. 19 because B is asking for a supply of power corresponding with that demanded by A, and under similar circumstances; of Sec. 20 because an undue preference is by the circular to be given to A as compared with B. The plaintiff is, in my judgment, entitled to a declaration that the differentiation proposed by the circular of September 25th, 1911, between those consumers of over 6,000 units per quarter for power who do and those who do not take their lighting exclusively from the Council, is in contravention of Secs. 19 and 20 of the Electric Lighting Act, 1882. Then there will be liberty to apply for an injunction if necessary. If the defendants determine to appeal, no such application will be made while the appeal is pending. The defendants must pay the costs of the action.

Godfrey *v.* Cox.

Mr. Muir Mackenzie, one of the Official Referees of the High Courts, on May 13th, heard this action, in which Mr. Herbert James Godfrey, electrical engineer, of High Road, Balham, claimed from Mr. Cox, a retired dentist, £89 8s., the balance of account for "goods sold and delivered and work done to the order of the defendant" in respect of electric lighting and heating at his house 'Belmont," at Streatham.

Mr. E. G. Palmer, with him Mr. Godfrey C. Hutchinson, instructed by Mr. R. C. Monty Hether, appeared for the plaintiff, and Mr. Le Riche, instructed by Mr. David C. Cragie, for the defence.

The defence set up was an admission of the employment of the plaintiff with an allegation that the work was done negligently and improperly, there was also a general denial of liability, but the sum of £38 8s. was paid into Court.

From the statement of counsel, it appeared that the plaintiff was called upon to do the work upon existing fittings and at cut prices. The materials supplied and the workmanship were not, said the plaintiff, inferior, being of a kind consistent with the kind of work contracted for. "Belmont" was an old suburban house, and was at the date of the contract partly wired. As far as could be gathered the wiring and electric light fittings had been in the building for some years and were in bad condition. Mr. Cox was having his house redecorated and there were certain structural alterations being made. It was under these circumstances that Mr. Godfrey approached Mr. Cox, with the result that a contract was entered into. It was found at starting that the whole of the work was in one circuit, and Mr. Godfrey gave instructions to his workmen to split it up into four. Certain work was done which was not included in the contract particularly in relation to the sinking, according to orders given to the plaintiff's foreman, into the walls previously exposed wires and laying them in tubing sunk into the walls. The work proceeded steadily, but the plaintiff experienced great difficulty in doing it by reason of the decoration work being carried on simultaneously. As the work progressed Mr. Godfrey received a cheque on account for £15, but he was not successful in his applications for further payments, and finally on the completion of the contract he asked that the work should be inspected suggesting a day. The plaintiff's foreman, a Mr. Lovegrove, attended accordingly for the purpose of carrying out a test, but no-one appeared on behalf of the defendant, and the surveyor on the premises refused to have anything to do with it, saying that he was not concerned. The County of London Electric Supply Co., however, came and made a test, but found the walls being washed with a hose pipe, which was not a proper thing to do. They, however, only found fault with the switches in the basement, which leaked, and required renewing, but that work did not come within the plaintiff's contract. The writ was issued, and then the plaintiff succeeded in getting an inspection, but he was not allowed to be present, although his foreman and one of his experts were present. An insulation test was made, which was satisfactory. Referring to the allegation of the defendant, counsel said that one of the grounds of complaint was that there was no electrical continuity, and others were that there were certain gaps where the old wires had been extended, that there were gaps where the wires were bare, that the wiring to the garage was bad, and that there were certain loose joints. There was also an allegation as to a joint-box under the gravel path having been filled up with clay, and that certain wires had not been enclosed in tubing. It was admitted that there was justification for complaint as to certain defects, which were of a very slight character. Liability was also admitted for certain gaps in the joints, in regard to the short lengths of casing, and the plaintiff would be willing to supply solid drawn tubing instead of close jointed tubing. There were two other matters of complaint, for which there was justification. One was the joint-box under ground in the garden, and plaintiff was prepared to see that it was made watertight. The same remark would apply to a joint-box in the wall in the garden. The whole of the defective work could be done for a sum of from £8 to £10. The plaintiff's solicitor had written to the defendant's solicitor, stating that he, plaintiff, was prepared to satisfy, not only the Electric Supply Co., but the Insurance Co. also, but no notice was taken of that communication, and the defendant had the work done with a considerable amount of extra work at a cost of £61, for which he counterclaimed. The defendant also counterclaimed for rent, owing to his having been kept out of the premises, but the plaintiff said that the builders were in the house, engaged upon their work altogether unconnected with the electric fitting, for some time after the plaintiff's work had been completed.

Mr. Herbert James Godfrey, the plaintiff, gave evidence bearing out counsel's opening statement that he had contracted for electrical work with the Metropolitan Asylums Board, with the Wandsworth Board of Guardians, with the London, Brighton and South Coast Railway, and with H.R.H. the Princess Louise. He also added that he had done work frequently for Mr. Cox during the past 10 years.

Mr. Lovegrove, the plaintiff's foreman, gave evidence as to the work done under plaintiff's direction at "Belmont," and in cross-examination said that although he regarded the job as a good one, he could not say that the work was perfect in every respect.

Mr. George Henry Kilsby, electrical engineer, and manager to Messrs. Gifkins & Co., of Victoria Street, Westminster, said that on November 17th last he inspected the electrical work at "Belmont," and noticed that there was old electric lighting in the house, chiefly on the top floor and basement. Where gaps occurred it was possible to use continuity grips, but when the casing was partly wood and partly tube that was not done. There were between 20 and 25 gaps, some small, and some 4 or 5 in. long. For the smaller gaps a split sleeve might be used. The cost of supplying additional pieces of tubing and split sleeves would be about £2 5s.

On May 14th, Mr. Kilsby further said that he had agreed that the close-jointed tubing should be removed, and that there should be substituted for it screw joints. He also undertook to cure what defects there were outside. The cost of remedying the whole of the defects, both interior and exterior, would not exceed £10 or £11. The Supply Co. had connected when he went there, and had indicated that they were satisfied with the tests.

In cross-examination, the witness was asked whether gaps were not dangerous, and he replied that sometimes they might be, but he had never known of an accident in consequence. He agreed that the gaps should not be there, as they might be dangerous. For the locality, he thought the work was not unsatisfactory. Some of the outside work was bad, it was true, especially that portion which was enclosed in the close-joint tubing.

Mr. Richard Lund, electrical engineer, carrying on business as Lund Bros. & Co., at 78, Queen Victoria Street, who stated that he had carried out large contracts for the War Office and the Admiralty during the past 25 years, gave confirmatory evidence.

Several witnesses called for the defence gave evidence in support of the allegation that the work was defective and unsatisfactory.

On Friday the hearing was resumed and concluded, when the Referee reserved judgment.

MYGATT *v.* GLYNN.

IN the Court of Appeal on Wednesday, the Lord Chief Justice, Lord Justice Phillimore and Mr. Justice Lush dealt with the appeal of Mr. Anglo Otis Mygatt, of Clifford Street, Bond Street, W., the managing director of Holophane, Ltd., a company formed for the purpose of manufacturing and distributing a new prismatic shade for electric and other lights, from a judgment for £2,000 in favour of Major Geoffrey Carr Glyn, of Eaton Place, who was a director of the company. In the Court below Mr. Mygatt claimed £4,660 on a bill of exchange which he said the defendant dishonoured. In a counterclaim Major Glyn claimed 10 per cent. of the profits made by the plaintiff out of the Holophane Co., in return for which the defendant relieved the plaintiff from all the worries and anxieties connected with the business. It was on this counterclaim that the defendant succeeded and obtained judgment, against which the plaintiff now appealed.

The Court ordered a retrial of the counterclaim on which the defendant succeeded, holding that the Judge assessed the damages due to Major Glyn on insufficient evidence.

PARLIAMENTARY.

Bristol Corporation Tramways Bill.

AS already stated in the ELECTRICAL REVIEW, Lord Lytton's Committee of the House of Lords has passed the preamble of the above Bill. When the Committee came to consider the clauses a great deal of discussion arose regarding the proposed working to carry out the views of the Committee. The parties subsequently conferred and agreed upon the following new clause:—(1) Notwithstanding anything contained in the Bristol Tramways Acts, 1872 to 1911 (including in that expression, where used in this section, the St. George and Hanham Light Railway Order, 1898), the Corporation shall, within six months after May 1st, 1915, proceed to purchase, and the company shall sell to the Corporation, the whole of the undertaking of the company upon the terms, and in manner following, that is to say, as to so much of the undertaking (other than the light railway portion thereof) as is within the city as the same existed on January 1st, 1904, upon the terms of Sec. 43 of the Tramways Act, 1870. As to the remainder of the undertaking (including the light railway portion thereof), upon such terms, as failing agreement, shall be determined by an arbitrator to be fair, having regard to all the circumstances of the case. (2) The payments to be made by the Corporation to the company for the undertaking shall, failing agreement, be determined by an engineer or other fit person nominated as arbitrator by the President of the Institution of Civil Engineers, on the application of either party. (3) The purchase of the undertaking of the company shall be carried into effect with all due diligence, and shall be completed by a deed of conveyance duly stamped, and upon the completion of the said conveyance the undertaking of the company shall be transferred to the Corporation, and as from such transfer all the rights, powers and authorities of the company in respect of the undertaking of the company shall be transferred to, and vested in, and may be exercised by the Corporation. (4) For the purposes of this section the expression, "the undertaking of the company," means the undertaking of the company authorised by the Bristol Tramways Acts, 1872 to 1911, as existing at the date of such purchase.

Walsall Corporation Bill.

A SELECT COMMITTEE of the House of Commons, presided over by Mr. Gardner, has had under consideration this Bill, which deals, among other matters, with proposals for extending the borough tramways to outlying districts.

The HON. J. D. FITZGERALD, K.C., explaining this part of the Bill, said that four new trackless trolley routes were proposed (1) commencing from the existing tramway at Rushall, through Pelsall to Brownhills, and from there back to the present terminus at Walsall Wood; (2) a continuation of the Bloxwich line through Great Wyrley to Cannock; (3) from the existing terminus at the Great Barr boundary on the Birmingham Road to Scott Arms, Great Barr; and (4) along Corporation Street and West Bromwich Road to the Wednesbury boundary at Tame Bridge. The last named route was intended to be connected up with West Bromwich, which town last year obtained power to run trolley trams and motors up to their borough boundary. The intention was when they had constructed their trolley route, to connect up with it and make a complete trolley route from Walsall to the centre of West Bromwich. The opponents of the Bill were the Staffordshire County Council and the Urban District Councils of Brownhills and Cannock, who asked for contributions for the maintenance of the roads. Counsel asked the Committee not to impose any such condition upon the promoters, and pointed out that if a private company ran a service of motor-'buses in Walsall, the County Council could not ask them for a single penny.

ALDERMAN COPE, chairman of the Tramways Committee, giving evidence in support of the Bill, said that the Corporation had successfully operated tramways in the town for the last 14 years. He was strongly of opinion that the new trolley routes were greatly needed to increase the travelling facilities of the various districts through which they would run.

MR. HAMILTON, general manager of the Leeds Corporation Tramways, also gave evidence supporting the Bill, as did MR. SPENCER, general manager of the Corporation Tramways in Bradford.

Questioned on the point of the Corporation being compelled to make a contribution for road maintenance, Mr. Spencer said he thought it would be very unfair to put such a clause into the Bill. He could not see why trams and trackless trolley vehicles, which were the poor man's conveyance, should be compelled to contribute towards the maintenance of roads, when motor-'buses did not contribute anything at all.

MR. FORBES LANKESTER, addressing the Committee on behalf of the County Council, submitted that it was only fair that they should be paid half the cost of such road reconstruction as would be rendered necessary by the introduction of new traffic.

After hearing considerable evidence, the Chairman said the Committee had come to the decision that the Walsall Corporation should pay £4,000 to the Staffordshire County Council, apart from street widening, if required. That was to apply over the whole road system. Walsall would pay three-eighths of a penny per car-mile on the trolley traffic undertaking.

On May 12th considerable discussion took place relative to clauses, and Mr. Fitzgerald, for the promoters, agreed to a sub-clause under which, if there should be a dispute as to whether a road should be reconstructed, the question should be submitted to an arbitrator. An amended clause was also agreed to under which, in the event of it being necessary to reconstruct two or three miles of roadway at a cost of £5,000 or £6,000, the amount payable to the Walsall Corporation should be limited to £4,000, the balance going to the local authorities which had to reconstruct.

Electric Lighting Provisional Order Bills.

THE following Electric Lighting Provisional Order Bills, promoted by the Board of Trade to confirm Orders, have been before the Examiners, and ordered to go for second reading:—

No. 1 Bill.—Confirms orders to Hawarden R.D.C.; to Midland Electric Light and Power Co., in respect of Kenilworth; to Ledbury Electric Supply Co., in respect of Ledbury; to Llanfairfechan U.D.C.; to Merthyr Electric Traction and Lighting Co. (Amendment); Newton-in-Makerfield U.D.C.; to Oulton Broad Electricity Co., Ltd., in respect of Oulton Board; to James Herbert Edwards, in respect of Ruthen; to Slaithwaite U.D.C.; to Thornton U.D.C.; to Messrs. Petters, Ltd., in respect of Yeovil.

No. 2 Bill.—To South Wales Electrical Power Distribution Co., in respect of Abercarn; to Lancashire Electric Power Co., in respect of Chorley; to Farnham Gas and Electricity Co. (extension of area); to Harwich Corporation; to Corporation of Hull (extension); to Knottingley U.D.C.; to Leeds Corporation (extension); to James Herbert Edwards, in respect of Warminster.

No. 3 Bill.—To James Duncan, in respect of Aboyne and District; to James Duncan, in respect of Ballater; to James Duncan, in respect of Ellon.

No. 4 Bill.—To Gilbert Allom in respect of Banstead, Walton-on-the-Hill and Kingswood; to the Derbyshire and Nottinghamshire Electric Power Co. in respect of Beeston and district; to James Herbert Edwards in respect of Bradford-on-Avon; to Frederick Harold Edwards in respect of Feltham and district; to the U.D.C. of Gelligaer; to the Derbyshire and Nottinghamshire Electric Power Co. in respect of Heanor Eastwood and district; to Mr. Bernard Edward Granville Bailey, the Hon. Weetman Harold Miller Pearson, M.P., and Mr. Thomas Stallibrass in respect of Midhurst and district; to the Colne Valley Electric Supply Co., Ltd., in respect of Rickmansworth and Chorleywood.

Midland Railway Co.'s Bill.—Lord Barnard's Select Committee of the House of Lords has passed the preamble of the Bill promoted by the Midland Railway Co. for the construction, at an estimated cost of £629,276, of a double line of railway, a mile and a half in length between a point of junction with the London and Blackwall Railway in Stepney and a junction with the Midland Railway in Bromley-by-Bow; and the widening and equipment of the existing railway, 7½ miles long between Barking and Upminster, at a cost of £252,836.—Mr. Talbot, K.C., for the promoters, explained that the proposals were brought forward to carry out the obligation placed on the Midland Co. when they were before Parliament in connection with the acquisition of the London, Tilbury and Southend Railway. The first proposal would take some years to carry out.—Mr. Tatlow, chief assistant to the general manager of the Midland Co., stated that the company had under consideration the question of the electrical equipment of the whole of their system in the neighbourhood of London, as well as the line to Southend.—The opposition to the Bill came from the London County Council, as owners of certain schools and a number of private petitioners, the ground of opposition being that the proposed works would seriously prejudice property.—The Committee held that this matter must be left to the general law.

London Electric Railways Bill.—This Bill, which has already passed the House of Commons, came on Friday before Lord Lamington's Committee of the House of Lords. The principal object sought is the compulsory acquisition of land in Westminster Broadway for the erection of offices, and powers are also sought for the construction of subways and escalators at Piccadilly Circus, Trafalgar Square and Tottenham Court Road. The only opposition came from the Cannon Brewery Co., in regard to the acquisition of St. James' Restaurant, and on the suggestion of the Chairman the parties conferred and came to an agreement. The preamble was passed and the Bill reported for third reading.

Tramway Provisional Orders.—The Examiners have passed the Tramway Provisional Order Bill which authorises the Corporation of Rotherham to construct several short lengths of tramway in the borough. Standing Orders have also been found to have been complied with in regard to the Western Valleys (Monmouthshire) Railless Electric Traction (Extension). Altogether about 17 furlongs of route are proposed to be run over, and power is given to raise £20,000 additional capital.

Stone Gas and Electricity Bill.—The Unopposed Bill Committee of the House of Commons has passed the Stone Gas and Electricity Bill, the chief objects of which are to extend the existing limits of supply. The Bill has already passed the House of Lords.

Newcastle Corporation Bill.—The Standing Orders Committee of the House of Commons has decided to allow the Newcastle-on-Tyne Corporation to include a new clause in its Bill to enable it to run motor-'buses in the urban district of Weetslade.

Second Readings.—In the House of Lords the London United Tramways Bill, the Deal and Walmer Gas and Electricity Bill, and the North Metropolitan Electric Power Supply Bill, were read a second time.

FOREIGN AND COLONIAL TARIFFS ON ELECTRICAL GOODS.

AMENDMENTS.

AUSTRALIA.—The Customs Authorities have issued the following decisions as to the duties to be levied on certain electrical and similar goods imported into the Commonwealth; the duties quoted in each case are those under the preferential tariff in British goods:—

Ears and Trailing Frogs for overhead wires of electric tramways; and Trolley Poles for cars	10 p.c. ad. val.
Electro-magnetic Chuck, rectangular ...	20 p.c. ad. val.
Steel Rails for suspension railway	10 p.c. ad. val.

NEW ZEALAND.—The Customs Authorities have decided that in the case of imports of Blackman electric forge blowers the parts are to be dutiable as follows: Blower, 20 per cent. ad. val.; motor, 10 per cent. ad. val. The duty quoted in each case is that levied under the preferential tariff on British goods.

FINLAND.—The Customs Authorities have issued a decision to the effect that electric pocket lamps, gilt or silver plated, are to be dutiable at the rate of 47.10 marks per 100 KG. on importation. —[NOTE. 25 Finnish marks = £1.]

ITALY.—The Customs Authorities have decided that glass insulators with internal bush of iron are to be dutiable as wares of glass with ornaments or accessories of other materials at the rate of 18 lire per 100 KG. Apparatus for giving electric shocks set in action by the insertion of a coin in a slot are dutiable at the rate of 150 lire per 100 KG. if the metallic wires along which the current is transmitted are covered with silk.

UNITED STATES.—The American Treasury Department have decided that "flashlight cases" composed of metal for manufacture into electric pocket lamps to be carried on or about the person are to be dutiable at the rate of 60 per cent. ad. val.

MEXICO.—The surtax of 50 per cent. of the amount of duty payable at the rates quoted in the Mexican tariff, plus the 10 per cent. surtax on those rates formerly levied, has been cancelled.

BAHAMAS.—A new tariff came into force on March 23rd last in accordance with which the duty on goods not specifically mentioned (no electrical goods are mentioned) as being separately dutiable and not free of duty are liable to a rate of 20 per cent. ad. valorem in place of the rate of 25 per cent. formerly leviable. The following goods are free of duty: Electrical apparatus and appliances; steam, oil, gas or electric engines; tramway rails; machinery; tramway rolling stock; telephones.

NEW PATENTS APPLIED FOR, 1914.

(NOT YET PUBLISHED.)

Compiled expressly for this journal by MESSRS. W. P. THOMPSON & Co., Electrical Patent Agents, 285, High Holborn, London, W.C., and at Liverpool and Bradford, to whom all inquiries should be addressed.

10,902. "Means for and method of reducing the frequency of electric currents by means of static transformers." A. M. TAYLOR. May 4th.

10,904. "Telephone switches." T. GREEN. May 4th.

10,930. "Instantaneous electrical liquid heater." A. HOWARD. May 4th.

10,945. "Brush holders for multipolar electric-motors." R. BOSCH (Firm of). May 4th. (Convention date, March 5th, 1914, Germany.) (Complete.)

10,948. "Electric railways." C. M. WHITE. May 4th. (Manley Edwin Sturges United States.) (Complete.)

10,980. "Electrolytic manufacture of alkali metals and alkali metal compounds." E. A. ASHCROFT. May 4th. (Complete.)

11,018. "Instruments or apparatus for registering telephone calls." J. S. FOLEY, W. HILL, and H. HACKETT. May 5th.

11,048. "Toy telephone." F. E. FOSTER and F. S. WERNER. May 5th.

11,052. "Telephone instruments." SIEMENS BROS. & Co., LTD., and F. BAKER. May 5th. (Complete.)

11,076. "Incandescent filament electric lamps." A. GODEFROY. May 5th.

11,089. "Electrical dynamo machines." SOC. ANON. DES AUTOMOBILES ET CYCLES PEUGEOT. May 5th. (Addition to 7,840/13. Convention date, May 16th, 1913, France.) (Complete.)

11,097. "Electric burglar alarm systems." J. P. WILLIAMS. May 5th. (Complete.)

11,102. "Methods of producing electric oscillations." E. VON LEPEL. May 5th. (Complete.)

11,112. "Manufacture of stratified fibrous materials, especially for chemical and electric-insulating purposes." MEIROWSKY & Co., AKT. GES., and M. MEIROWSKY. May 5th. (Complete.)

11,116. "Electrical re-actors." P. TORCHIO. May 5th. (Complete.)

11,120. "Antenna for wireless telegraphy and telephony." N. J. JEFFRIES. May 5th. (Complete.)

1,156. "Connecting-arrangements for electric circuits." J. H. WOOLLISCROFT and H. T. BOOTHROYD, LTD. May 6th.

11,159. "Dynamo-electric machines." T. FIORANI. May 6th. (Convention date, May 29th, 1913, Italy.) (Complete.)

11,165. "Electrical energy supply installations." A. P. LUNDBERG, G. C. LUNDBERG, P. A. LUNDBERG, and G. PEGG. May 6th.

11,185. "Electrical transformers." SIEMENS BROS. DYNAMO WORKS, LTD. May 6th. (Siemens-Schuckertwerke G.m.b.H., Germany.) (Complete.)

11,211. "Register circuits for telephone installations with separate setting and speaking paths." SIEMENS & HALSKE AKT. GES. May 6th. (Addition to 16,538/13. Convention date, May 6th, 1913, Germany.) (Complete.)

11,213. "Circuit arrangements for telephone exchanges." SIEMENS BROS. & Co., LTD. May 6th. (Siemens and Halske Akt. Ges., Germany.) (Addition to 18,356/12.) (Complete.)

11,216. "Magneto ignition apparatus suitable for use with internal combustion engines." A. SOAMES. May 6th.

11,222. "Telegraphy." A. P. OGILVIE & CREED, BILLE & Co., LTD. May 6th.

11,229. "Construction of telephone-index or directory holder." H. R. HAZARD. May 6th.

11,244. "Electric machines for use in motor cars." P. J. M. GASNIER. May 6th. (Divided application on No. 26,838/13.) November 21st. Convention date, May 7th, 1913, France.) (Complete.)

11,249. "Magnetos intended more especially for lighting bicycle lamps and the like." J. A. Hardy. May 7th. (Complete.)

11,252. "Combination contact for electrical or other purposes." J. DUGDILL. May 7th.

11,263. "Reflectors, diffusers and the like for electric and other lights." T. BALLINGER. May 7th.

11,265. "Method of placing the trolley poles of tramcars on the overhead wire and the removal of same." G. E. WATMOUGH and W. J. SMITH. May 7th.

11,301. "Electrical time-switches." H. LEITNER. May 7th.

11,309. "Supports for overhead conductors for electric railways. BRITISH WESTINGHOUSE ELECTRIC AND MANUFACTURING CO., LTD. May 7th. (Westinghouse Electric and Manufacturing Co., United States.) (Complete.)

11,312. "Electric brakes for railways and the like." C. W. PAGET and J. DALZIEL. May 7th.

11,325. "Accumulators." G. BEAUPERE. May 7th. (Convention date, May 8th, 1913, Belgium.) (Complete.)

11,340. "Means for preventing too rapid changes of speed of machinery." SIEMENS-SCHUCKERTWERKE G.M.B.H. May 7th. (Convention date, May 7th, 1913, Germany.) (Complete.)

11,343. "Means of supporting and insulating conductor-rails of electric railways." E. P. B. ESTLER. May 8th.

11,369. "Safety magnetic clutch locking-apparatus for railway carriage doors." W. T. B. MASTERS. May 8th.

11,372. "Means for actuating signals on locomotives by electro-magnetic induction." G. KAPP. May 8th.

11,399. "Dynamo-electric machines. CROMPTON & Co., LTD., and N. PENSABENE. May 8th.

11,404. "Electrical condensers and the manufacture thereof." G. GILES. May 8th. (Addition to 10,895/14. Convention date, July 3rd, 1913, Switzerland.) (Complete.)

11,408. "Appliance for electrical jacquard machines." OSTERREICHISCHE SIEMENS-SCHUCKERTWERKE AND REGAL PATENTE G.M.B.H. May 8th. (Convention date, May 10th, 1913, Austria.) (Complete.)

11,410. "Electrical contact device." OSTERREICHISCHE SIEMENS-SCHUCKERTWERKE AND REGAL PATENTE G.M.B.H. May 8th. (Convention date May 10th, 1913, Austria.) (Complete.)

11,436. "Protective devices for alternating electric current machines." BRITISH THOMSON-HOUSTON CO., LTD., AND F. H. CLOUGH. May 8th.

11,474. "Arrangements for regulating the speed of machinery." SIEMENS-SCHUCKERTWERKE G.M.B.H. May 9th. (Convention date, May 10th, 1913, Germany.) (Complete.)

11,492. "Housing for electro-magnets." E. GENGENBACH. May 9th. (Complete.)

11,496. "Electric lighting equipment of motor-cars and like vehicles." G. A. JELLY. May 9th.

11,516. "Electric control apparatus for signalling systems." A. D. CARDWELL. May 9th. (Divided application on 17,439/13, July 29th. (Complete.)

PUBLISHED SPECIFICATIONS.

Copies of any of the Specifications in the following list may be obtained of MESSRS. W. P. THOMPSON & Co., 285, High Holborn, W.C., and at Liverpool and Bradford; price, post free, 9d. (in stamps).

1913.

24,243. ARC LAMPS. H. Weiss. October 23rd.

4,071. TELEPHONY. D. S. Hulfish. February 17th.

6,911. PROCESS FOR MANUFACTURING ARTICLES OR OBJECTS OF TUNGSTEN. O. Voigtlander. March 20th. (March 23rd, 1912.)

9,140. THERMOSTATS FOR CONTROLLING ELECTRIC CIRCUITS. A. W. Prim and F. W. Roper. April 18th.

9,205. AUTOMATIC TELEPHONES. J. M. Furnival. April 19th.

9,384. ELECTRIC SWITCHES. British Thomson-Houston Co. (General Electric Co.). April 21st.

9,484. CAPELS OR COUPLINGS FOR CABLES, ROPES, AND FOR LIKE PURPOSES. J. S. Sparkes. April 22nd.

9,593. TELEPHONE SYSTEMS. Automatic Telephone Manufacturing Co. (Automatic Electric Co.). April 23rd.

9,768. TELEGRAPHY. W. Judd, B. Davies, and Eastern Telegraph Co. April 25th.

9,996. CONTROL OF ELECTRO-MECHANICAL TRANSMISSION GEAR. H. F. Haworth. April 29th.

10,892. MEANS FOR IMPROVING THE ILLUMINATING EFFECT OF INCANDESCENT ELECTRIC LAMPS. W. J. Beville. May 8th. (November 10th, 1913.)